

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

AR0008

75 Hawthorne Street San Francisco, Ca. 94105-3901

June 19, 1992

SFUND RECORDS CTR 88132400 ITX 2166-02979

Mr. Gary Yamamoto
Office of Drinking Water
Department of Health Services
1449 West Temple Street
Los Angeles, CA 90026-5698

RE: Draft Proposed Plan for the Glendale North

Plume OU of the San Fernando Valley Superfund Project

Dear Mr. Yamamoto:

EPA has received your letter dated June 12, 1992 regarding comments on the Draft Proposed Plan for the Glendale North Plume Operable Unit (May 21, 1992). EPA would like to take this opportunity to respond to your comments.

1. Proposed Cleanup Plan

Data regarding contaminants in the groundwater in the Glendale Study Area obtained by EPA during the remedial investigation was used to estimate the health risks associated with exposure to the groundwater. As stated in the Draft Proposed Plan, EPA completed a risk assessment for the Glendale North OU in January 1992 that estimated the potential risks to public health under current situations and under potential future situations. The risk assessment examined the potential health effects if individuals were exposed to contaminated groundwater from the upper and lower zones of the aquifer. Chemicals of potential concern for the Glendale North OU used in the risk assessment calculations included: TCE, PCE, carbon tetrachloride, 1,1-DCA, 1,2-DCA, 1,1-DCE, total 1,2-DCE, nitrate, and others including some metals detected in both trace quantities and, on occasion, above MCLs.

Some metals including arsenic, nickel, mercury, zinc, and chromium were detected above MCLs in one or more of the shallow monitoring wells, during the initial sampling event of September 1989. The initial event took place shortly after the wells were developed and the samples were not filtered to remove any suspended solids. All subsequent sampling events included filtering of the samples to accurately represent the levels of dissolved metals constituents. No metals with the exception of chromium and lead which were detected just once at levels just slightly above their MCLs and mercury which was detected twice at levels just slightly

labove the MCL, in one coarsely filtered sample have been detected above MCLs since the initial sampling event. In addition, the sampling data from the initial sampling event was not verified and therefore is not reliable. The administrative record guidance directs EPA not to include unvalidated data in the administrative record and therefore EPA may not rely upon such data in remedy selections.

EPA believes that samples collected during the initial sampling event contained suspended particulate matter. The samples filtered and were preserved using nitric not The nitric acid preservative effectively dissolves preservative. the suspended solids in the samples thus increasing the metals concentrations in these samples. This particulate matter may have been introduced during drilling or from formation disturbance of the naturally occurring sediments. The first step in any treatment of the extracted groundwater will include prefiltration prior to treatment for VOCs to ensure the removal of any particulate matter. These particulates may be the result of several factors including well construction, well development, and sampling techniques. The EPA believes that these particulates do not accurately reflect insitu groundwater conditions for the unfiltered samples. believes that the metals detected in some monitoring wells during the initial sampling event are not compounds of concern for the Glendale North OU and that they do not pose any risk to public In addition, EPA will continue to monitor the groundwater health. the Glendale Study Area to ensure that metals are not contaminants of concern.

The preferred remedy would require treatment of the groundwater to MCLs for all contaminants of concern. Therefore, any water to be accepted by the City of Glendale is expected to meet all current MCLs. EPA's preferred alternative involves reinjecting the treated water if the City declines for any reason to accept the water. Enclosed for your review are two memoranda that further support EPA's position regarding metal detections in groundwater samples obtained during the early sampling events (see attachments 1 and 2).

2. <u>Background on the Groundwater Contamination in the San Fernando Valley</u>

We will change the Proposed Plan to reflect this more accurate information, as provided by you.

3. Selection of Cleanup Alternatives

CERCLA Section 121(e) provides that no permit shall be required for the onsite portion of any remedial action. Therefore, no permit can be required for the design, construction or operation

of the VOC treatment plant. However, all substantive requirements of any permit which would have been required shall be included in the selected remedy through the process of state identification and selection of applicable or relevant and appropriate requirements ("ARARs"). EPA has solicited ARARS for the onsite portion of the remedy from the State of California in compliance with the National Contingency Plan, 40 C.F.R. Section 300.515(h). For further information on ARARs see the Administrative Record. Because the preferred remedy is described as including provision of the water to the City of Glendale (assuming the City accepts it), EPA would not consider the actual distribution of the water by the City to be part of the selected remedy. Such action by the City would have to meet any otherwise applicable permit requirements.

As stated above in response to #1, the preferred plan would require treatment of extracted groundwater to MCLs for all contaminants of concern. We also explained in that response why contaminants other than VOCs are not expected to occur in the extracted water. The Administrative Record identifies applicable or relevant and appropriate requirements for reinjection, as developed through correspondence with both the California Environmental Protection Agency and the Regional Water Quality Control Board, the agency with jurisdiction under state law over reinjection. While a permit for onsite reinjection would not be required, all ARARs selected for reinjection in the remedial action would be met.

4. EPA's Preferred Alternative

Your office indicated that the following sentence is not clear: "EPA is the lead agency for this project and the Department of Toxic Substances Control of the State of California Environmental Protection Agency (CAL-EPA) is the support agency." This sentence states that DTSC is the support agency to EPA for the San Fernando Valley Superfund cleanup, per the definition in 40 C.F.R Section 300.5 (see attachment 3).

Should you have any questions please do not hesitate to contact me at (415) 744-2249 or have your attorney contact Marcia Preston of the EPA Region IX Office of Regional Counsel at (415) 744-1388.

Sincerely,

Claire Trombadore

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Project Manager

cc: Marcia Preston, EPA Office of Regional Counsel

attachments

CHMHILL

TO:

Claire Trombadore/EPA

Kevin Mayer/EPA

COPIES:

Sybil Hatch/CH2M HILL/SFO

FROM:

Daniel Wendell/CH2M HILL/LAO

Andy Austin/CH2M HILL/LAO

DATE:

June 16, 1992

SUBJECT:

Review of Metals Data from Monitoring Wells Located in the Glendale

Study Area, North Operable Unit Area, San Fernando Valley

PROJECT: SFO69125.05.01

Introduction

To better evaluate and manage RI/FS efforts in the Glendale Study Area, EPA has divided the area into the "Glendale North Operable Unit" and "Glendale South Operable Unit" Groundwater samples obtained from EPA's RI monitoring wells in the Glendale North Operable Unit (GNOU) area have been analyzed for potential organic and metal contaminants. Results of metals analyses indicate that metal concentrations are generally lower in filtered samples relative to unfiltered samples (CH2M HILL, December 30, 1991). Some metals have been detected in concentrations above primary and secondary MCLs, primarily in unfiltered samples. These unfiltered samples do not appear to accurately reflect insitu groundwater conditions (CH2M HILL, December 30, 1991). This memorandum provides a review of potential groundwater contamination in the GNOU area by metals that have promulgated primary or secondary MCLs. Primary MCLs are healthbased standards whereas secondary MCLs address aesthetic concerns such as taste and As part of this work, available metals concentration data were compiled and reviewed for RI wells and production wells located in the GNOU area.

Background

To date, 29 RI monitoring wells have been constructed in the GNOU area to better define the horizontal and vertical extent of contamination. Eleven of these monitoring wells are shallow water table monitoring wells (also referred to as "vertical profile borings" or "VPB"s), and 18 are "cluster wells" that are completed at deeper intervals. Most of the shallow water table monitoring wells in the GNOU area have been sampled for metals four times, and three of the wells have been sampled five times (CS-VPB-04, CS-VPB-05, and CS-VPB-06). The most recent sampling event was in April 1992; analytical results are not yet available for this sampling event. Cluster wells in the area have been sampled for metals three times, with the most recent sampling occurring in April 1992.

Dedicated submersible pumps for purging and sampling have recently been installed in most of the RI monitoring wells, and were used during the most recent (April 1992) sampling event. Prior to this sampling event, samples were typically obtained by installing a temporary submersible pump, purging, and then collecting groundwater samples with a bailer. However, dedicated submersible pumps for purging, and bladder pumps for sampling, were installed in CS-VPB-01, CS-VPB-04, CS-VPB-05, CS-VPB-07 and CS-VPB-08, were installed after the initial sampling, and were used in subsequent sampling efforts.

Metal samples from RI wells in the GNOU area have been obtained without the use of filters, using 1.2 um filters, and using 0.45 um filters. Resulting metals analyses have differed, indicating that metals concentrations are at least partially dependent upon filtering methods (CH2M HILL, December 30, 1991). Available data indicate that "sampling artifacts" can be significant in unfiltered samples (CH2M HILL, December 30, 1991). Sampling artifacts are related to the sampling process, and are unique to the well bore area. These artifacts include drilling fluids that have invaded the formation, and corrosion products that form in and near the well bore and sampling systems. Iron oxyhydroxides are a common corrosion product within a well bore environment and can strongly adsorb metals. Care must be taken to prevent these materials from entering the sample, or else the sample will not be representative of aquifer conditions. To address potential problems with sampling artifacts, metals sampling protocol for the RI monitoring wells now specifies use of 0.45 um filters. Such filtering is recommended by EPA (1986).

Discussion of GNOU Area Metals Data

To better evaluate which type of RI monitoring well samples (unfiltered, 1.2 um filtered, or 0.45 um filtered) best represent metals concentration within insitu GNOU area groundwater, results of metals analyses from production wells were compiled and compared with nearby RI monitoring well data (Appendix A). Due to prolonged pumping, these production wells should not be affected by well bore/sampling artifact effects, and samples from these wells should reflect the amount of metals transported by the local groundwater system. These wells are sampled without filters, using bottles that contain preservatives (Becky Luman, June 4, 1992; Ray Natario, June 4, 1992). Because many of the RI monitoring wells in the area are screened near or opposite production well screen, the two data sets should be similar (Figure 2; Appendix B). For example, RI monitoring wells CS-VPB-05, CS-C05-160, and CS-C05-290 are opposite much of the screen of production well CS-45 (Figure 2).

To aid in comparison of production well data and RI monitoring well data, the wells were divided into two local "subareas" that consist of relatively closely spaced wells (Figures 1 and 2; Tables 3 and 4). Because of the close proximity of the wells and similarity of screened intervals, and providing that sampling artifacts effects are not present, RI monitoring wells within each individual subarea should exhibit similar metals concentrations as the nearby production wells.

Metals concentration data for samples obtained from Subarea 1 and 2 production wells most closely resembles filtered data from the RI monitoring wells (Tables 1 and 2).

Results of unfiltered samples indicate relatively high concentrations of metals (commonly in exceedence of one or more primary and/or secondary MCL), and are *not* reflective of production well data. Therefore, unfiltered data are *not* considered to be representative of the metals content of local insitu groundwater.

Elevated concentrations of metals within the unfiltered samples are probably related to sampling artifacts. The sampling artifacts may have several possible origins. Most importantly, during installation of the temporary submersible pump used for purging it is likely that rust and other material inside the casing well was disturbed, resulting in suspension of particulate matter within the well; introduction of the bailer caused additional disturbance. Particulates that became suspended in the water within the well casing at this times may have been incorporated into the bailed samples, digested by the acid preservative in the sample bottle, leading to results that do not accurately reflect insitu groundwater conditions. For the above reasons, further discussions of metals data for the GNOU area concerns only filtered data.

Available production well data and filtered RI monitoring well data indicate that groundwater in the GNOU area generally meets both primary and secondary MCLs for metals (Table 3; Appendix C). Only four filtered RI monitoring well samples exhibit primary or secondary MCL exceedences:

- CS-C01-105. March 1991 sample results indicate 2,280 ug/l iron (secondary MCL = 300 ug/l), and 271 ug/l manganese (secondary MCL = 50 ug/l). Adjacent deeper cluster wells are below iron and manganese MCLs. It is possible that these relatively high iron and manganese concentrations represent field and/or laboratory contamination.
- CS-C02-180. March 1991 sample results indicate 54 ug/l manganese (secondary MCL = 50 ug/l). This represents a relatively small exceedence of a secondary (aesthetic) MCL.
- CS-C02-250. May 1990 sample results indicate 91 ug/l lead (primary MCL = 50 ug/l), and 8 ug/l mercury (primary MCL = 2 ug/l). A subsequent sample (March 1991) indicates nondetectable concentrations of these elements. Adjacent deep and shallow CS-C02 cluster wells also indicate nondetectable concentrations of lead and mercury.
- CS-VPB-06. May 1990 sample results indicate 3.4 ug/l mercury (primary MCL = 2 ug/l). A subsequent sample (May 1990) indicates nondetectable concentrations of mercury.

Summary and Conclusions

Previous work in the San Fernando Basin has shown that metals concentrations may vary depending upon filtering methods, and that unfiltered metals samples from RI wells are influenced by sampling artifacts. Production well samples are not influenced by sampling artifacts, and are therefore representative of local groundwater conditions. Metals data

from production wells located near some of the RI wells indicate generally low concentrations of metals, with all metal analytes below primary and secondary MCLs. Comparison of metals concentration data for the production wells with nearby RI monitoring wells indicates that concentrations of metals within filtered monitoring well samples are most similar to production well samples. Therefore, filtered RI monitoring well samples appear to provide the most representative metals data for insitu groundwater. Filtered metals data obtained from RI monitoring wells are generally below primary and secondary MCLs. The two observed primary MCL metals exceedences in filtered RI well samples have not been replicated. One of two observed secondary MCL metals exceedences in a filtered RI well sample (CS-C02-180) was relatively low, and the other (CS-C02-105) may have been affected by sample contamination. Results of the recent April 1992 quarterly sampling event, as well as results of ongoing groundwater monitoring by EPA in the eastern San Fernando Valley Basin, will help address these issues.

References

CH2M HILL, December 30, 1991, Review of Metals Data and Sampling Procedures, San Fernando Valley.

EPA, 1986, RCRA Groundwater Monitoring Technical Enforcement Guidance Document.

J.M. Montgomery Engineers, May 1977. Remedial Investigation of Groundwater Contamination in the San Fernando Valley, Final Draft, Section 7, Nature and Extent of Groundwater Contamination.

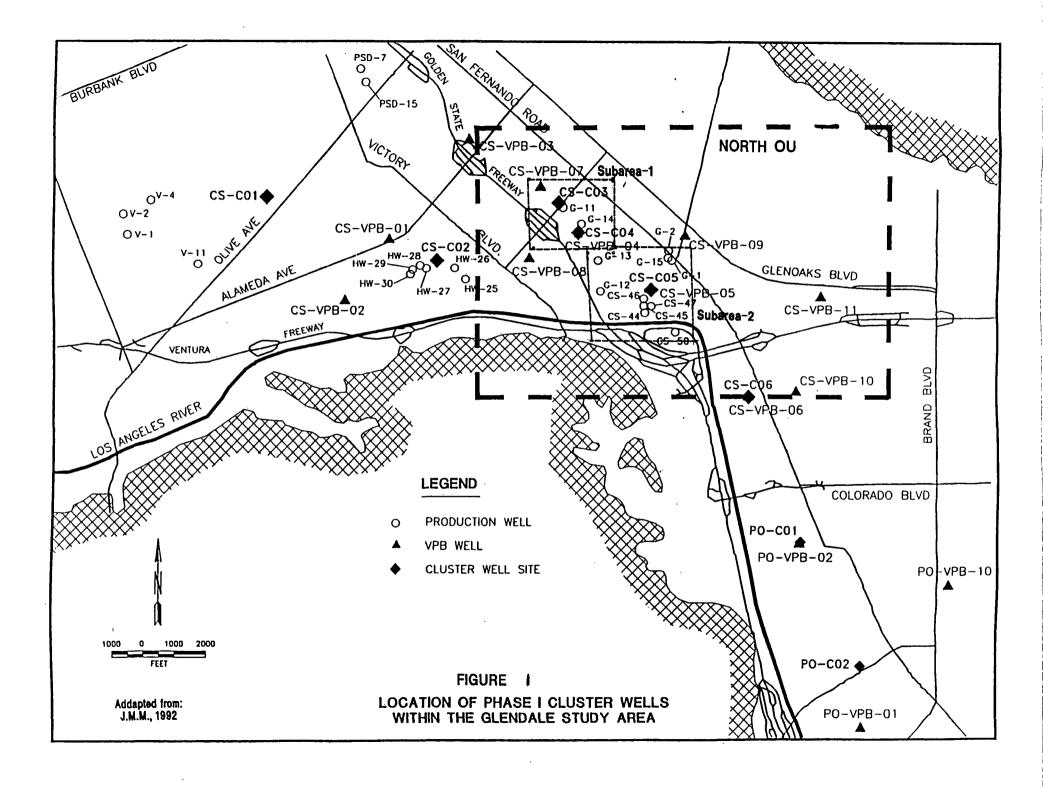
Los Angeles Department of Water and Power, January 1992. Technical Memorandum for Spinner Logging and Depth Specific Sampling with Related Aquifer Test Results, in the San Fernando Basin (SFB).

Luman, Becky, June 4, 1992, Los Angeles Department of Water and Power, personal communication.

Natario, Ray, June 4, 1992. City of Glendale, personal communication.

Puls, R.W. and Barcelona, M.J., 1989a, Filtration of Ground Water Samples for Metals Analysis, Hazardous Waste & Hazardous Materials, v. 6, No. 4, p.385-393.

Puls, R.W. and Barcelona, M.J., March 1989b, Ground Water Sampling for Metals Analyses, Superfund, Ground Water Issue, EPA/540/4-89/001.



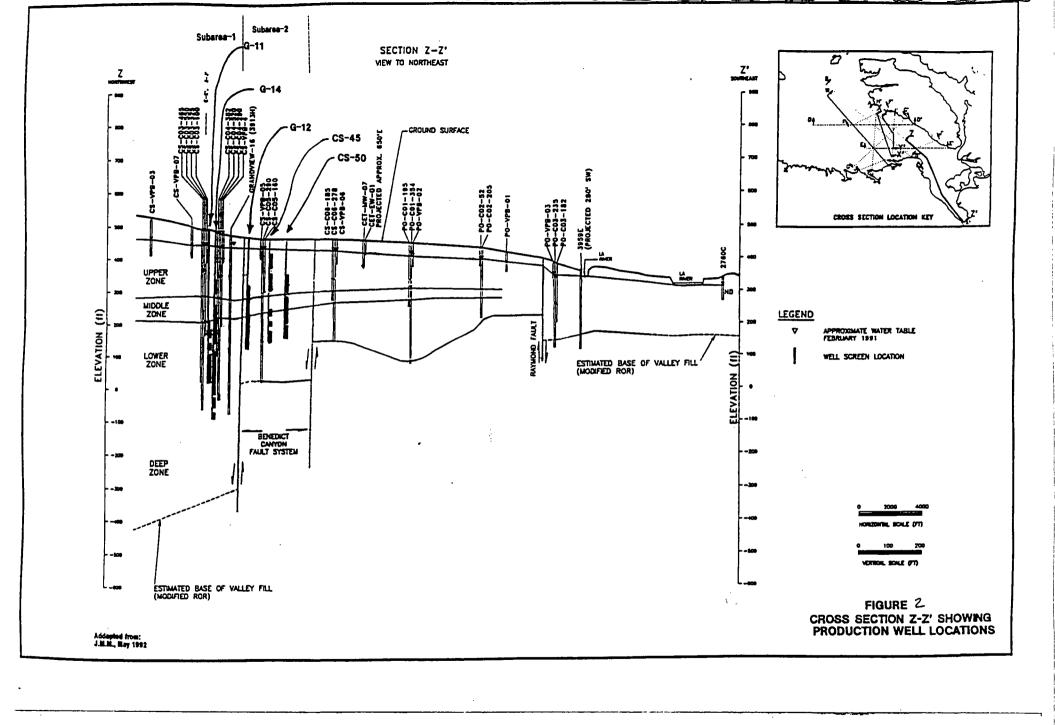


TABLE !

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G11	May-89			<1		<1	<5	2	<0.2		<20	<20	14	7
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CS-C03-100	Apr-91	0.45 u		0.0	246	0.0	0	0.0	0.0	4.2	0	44	18	16
CS-C03-325	Apr-91	0.45 u		0.0	71	0.0	0	0.0	0.0	0.0	4	57	31	0
CS-C03-465	Apr-91	0.45 u		0.0	69	0.0	0	0.0	0.0	0.0	4	86	27	5
CS-C03-550	Apr-91	0.45 u		0.0	56	0.0	0	0.0	0.0	0.0	4	93	41	0
CS-C04-290	Mar-91	0.45 u		0.0	85	0.0	0	0.0	0.0	1.1	0	85	22	17
CS-C04-382	Mar-91	0.45 u		0.0	82	0.0	0	3.0	0.0	1.6	0	134	16	5
CS-C04-520	Mar-91	0.45 u		0.0	57	0.0	0	2.4	0.0	0.0	0	227	15	0
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CS-C03-100	Apr-91	1.2 u		0.0	248	0.0	0	0.0	0.0	1.1	0	65	21	14
CS-C03-100		1.2 u		0.0				0.0	0.0	0.0				22
CS-C03-325	May-90	1.2 u		0.0	_			0.0	0.7	0.0	<u> </u>			15
CS-C03-465	Apr-91	1.2 u		1.9	68	0.0	0	0.0	0.0	0.0	0	141	23	0
CS-C03-465	May-90	1.2 u		0.0	_			0.0	0.0	0.0				11
CS-C03-550	Apr-91	1.2 u		1.4	58	0.0	0	0.0	0.0	0.0	0	108	29	8
CS-C03-550	May-90	1.2 u		0.0				0.0	0.0	0.0				13
CS-C04-290		1.2 u		0.0	82	0.0	0	0.0	0.0	0.0	0	20	32	4
CS-C04-290		1.2 u		0.0		1		0.0	0.0	0.0				12
CS-C04-382	Mar-91	1.2 u		1.2	77	0.0	0	0.0	0.0	1.4	0	153	16	4
CS-C04-382	Мву-90	1.2 u		0.0				0.0	0.0	0.0				10
CS-C04-520	Mar-91	1.2 u		0.0	57	0.0	0	2.2	0.0	0.0	0	210	14	0
CS-C04-520	May-90	1.2 u		0.0				0.0	0.6	0.0				0
CS-VPB-03	Jan-91	1.2 u		0.0		0.0	0	0.0	0.0	0.0	0			8
CS-VPB-04	Apr-91	1.2 u		2.2	116	0.0	28	14.0	0.0	0.0	0	8	13	5
CS-VPB-04	Sep-90	1.2 u		16.0		0.0	0	0.0	0.0	0.0	0			28
CS-VPB-04	May-90	1.2 u		0.0		0.0	70	0.0	0.0	0.0	0			28
CS-VPB-04	Jan-90	1.2 u												
CS-VPB-07	Feb-91	1.2 u		0.0	123	0.0	7	0.0	0.4	0.0	0	25	17	8
CS-VPB-07	Sep-90	1.2 u		16.0		0.0	0	0.0	0.0	0.0	0			0
CS-VPB-07	Jan-90	1.2 u												
CS-C03-325	Apr-91	1.2u		1.0	74	0.0	0	0.0	0.0	0.0	0	113	21	33

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CS-C03-325	Apr-91	Unfilt	2	0.0	П	127	0.0	П	24	Ţ	2.1		0.0		1.0	Τ	10		23,200	•	295	•	112
CS-C03-465	Apr-91	Unfilt	2	0.0	П	147	0.0	П	24	Т	2.0	T	0.0	П	0.0	T	14		31,800	•	307	•	154
CS-C03-550	Apr-91	Unfilt	2	1.0	П	71	0.0		0	Т	4.4	T	0.0		0.0	1	49		12,800	•	135	•	89
CS-C04-290	Mar-91	Unfilt	2	1.4	П	126	0.0	П	14	Т	6.5	T	0.0		1.1		5	_	12,200	•	218	•	48
CS-C04-382	Mar-91	Unfilt	2	1.2	П	94	0.0	П	0	丁	1.4		0.0		1.7	1	0	╗	8,720	•	96	•	28
CS-C04-520	Mar-91	Unfilt	2	0.0	П	69	0.0	T	0		1.0	\top	0.0		0.0	T	0	7	8,570	•	86	•	15
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CS-46	Mar-84			<10		2	\top	<10	<10	\top	<1	4	<20	-	<10	10
CS-46	Jul-81			<10		2	\top	<10	<10		<1	3	<20		30	30
CS-50	Jul-81			<10	7	2	┰	<10	<10		<1	3	< 20	-	<10	80
CS-50	Mar-79			<10		2	\neg	<10	<10		<1	3	<20	-	30	20
G-1	May-89			<1		<.		<5	2	1	<0.2	<1	<20	<20	14	27
G-2	May-89			<1		<	i	<5	2		<0.2	<1	<20	<20	14	6
G-12	May-89			<1		<1		<5	5	П	<0.2	1	<20	<20	14	12
G-15	May-89			<1		<		<5	2	$oxed{\Box}$	<0.2	<1	<20	<20	14	7
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CS-C05-160		1.2 u		0.0	75	0.0	,	0	1.1	\top	0.0	1.6	0	71	17	0
CS-C05-160		1.2 u		0.0		1			0.0	\top	0.4	0.0	1 -			8
CS-C05-290		1.2 u		0.0	158	0.0	7	0	1.1	Ħ	0.0	2.2	0	72	16	9
CS-C05-290	May-90	1.2 u		0.0			\top		0.0	П	0.0	0.0		 		12
CS-VPB-05	Feb-91	1.2 u		0.0	124	0.0	,	17	0.0	\Box	0.3	0.0	0	8	15	14
CS-VPB-05	Sep-90	1.2 u		11.0	 	0.0	,	0	0.0	77	0.0	0.0	0	1		40
CS-VPB-05	May-90	1.2 u		0.0		0.0	, T	0	0.0	\Box	0.8	0.0	0	1		8
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CS-C03-100	Apr-91	0.45 u		0.0	246	0.0	0	0.0		0.0		4.2	0		44	Γ	18	1	18
CS-C03-325	Apr-91	0.45 u		0.0	71	0.0	0	0.0		0.0	П	0.0	4		57		31	T	0
CS-C03-465	Apr-91	0.45 u		0.0	69	0.0	0	0.0	П	0.0	П	0.0	4		66		27	1	5
CS-C03-550	Apr-91	0.45 u		0.0	56	0.0	0	0.0		0.0	П	0.0	4		93		41	1	0
CS-C04-290	Mar-91	0.45 u		0.0	85	0.0	0	0.0		0.0	П	1.1	0	П	85		22	T	17
CS-C04-382	Mar-91	0.45 u		0.0	82	0.0	0	3.0		0.0	П	1.6	0		134		16	L	5
CS-C04-520	Mar-91	0.45 u		0.0	57	0.0	0	2.4		0.0		0.0	0		227		15		0
Filtered Analys	es, 1.2 um	:																	
CS-C01-105	Mar-91	1.2 ບ	2	0.0	106	0.0	0	0.0		0.0		1.1	0		2,280	•	271	•	16
CS-C01-105	Oct-90	1.2 u		0.0				0.0		0.0		0.0							104
CS-C01-285	Mar-91	1.2 u		0.0	93	0.0	6	0.0	Ш	0.0	Ш	0.0	0	┙	62	Ш	8	_	17
CS-C01-285	Oct-90	1.2 u		0.0		1		0.0	\perp	0.0	П	0.0		_1		Ц			15
CS-C01-558	Mar-91	1.2 u		0.0	62	0.0	0	0.0	11	0.0	Ш	0.0	0	_	72	Ц	42	1_	12
CS-C01-558	Oct-90	1.2 u							$\perp \downarrow$		Ш			\perp		Ц		$oxed{oldsymbol{ol}}}}}}}}}}}}}}}}}}$	
CS-C02-062	Mar-91	1.2 u		0.0	87	0.0	0	0.0	\perp	0.0	Ц	1.5	0	_	57	Ц	- 6	_	16
CS-C02-062	May-90	1.2 u		0.0	1	J	<u> </u>	0.0	$\perp \perp$	0.0	Ц	0.0		_		Ш		丄	36
CS-C02-180	Mar-91	1.2 u	2	1.8	51	0.0	0	0.0		0.0	Ш	3.0	0	\perp	181	Ц	54	•	0
CS-C02-180	May-90	1.2 u		0.0			1.1	0.0		0.0		0.0		\perp		Ц			38
CS-C02-250	Mar-91	1.2 u		1.3	58	0.0	0	0.0		0.0		0.0	0		148		40		0
CS-C02-250	May-90	1.2 u	1	0.0				91.0	•	8.0	•	0.0						<u> </u>	26
CS-C02-335	Mar-91	1.2 u		1.1	73	0.0	0	0.0	\prod	0.0	\prod	0.0	0		128		26		0
CS-C02-335	May-90	1.2 u		0.0				0.0	\prod	0.0	П	0.0		_ [17
CS-C03-100	Apr-91	1.2 u		0.0	248	0.0	0	0.0		0.0	\prod	1.1	0		65		21		14
CS-C03-100	May-90	1.2 u		0.0		T		0.0	T	0.0	П	0.0		Т				Г	22
CS-C03-325	Мау-90	1.2 u		0.0				0.0	\prod	0.7	П	0.0		T					15
CS-C03-465	Apr-91	1.2 u		1.9	68	0.0	0	0.0	77	0.0	\prod	0.0	0	T	141		23		0
CS-C03-465	May-90	1.2 u		0.0				0.0	\top	0.0	П	0.0				П	_	Π	11
CS-C03-550	Apr-91	1.2 u		1.4	58	0.0	0	0.0	77	0.0	\prod	0.0	0	1	108		29		8
CS-C03-550	May-90	1.2 u		0.0				0.0	11	0.0	П	0.0				\sqcap		П	13
CS-C04-290	Mar-91	1.2 u		0.0	82	0.0	0	0.0	77	0,0	\sqcap	0.0	0	\top	20		32	П	4
CS-C04-290	May-90	1.2 u		0.0	<u> </u>	1		0.0	77	0.0	\sqcap	0.0		\top		\neg		П	12
CS-C04-382	Mar-91	1.2 u		1.2	77	0.0	0	0.0	11	0.0	\sqcap	1.4	0	\top	153	\sqcap	16	П	4
CS-C04-382	May-90	1.2 u		0.0			1-1	0.0	1-1	0.0	1-1	0.0	1	_					10

TABLE 3

		1		1	1						1			
	 	Filt.	 	Primary	MCLs				l Wasan		Secondary	/ MCLs	+	
Well	Date	Size		As	Ba	Cd	Cr	Pb	Hg	Se	Cu	Fe	Mn	Zn
	\		>MCL	50	1,000	10	50	50	2	10	1,000	300	50	5,000
												1	1	
CS-C04-520	Mar-91	1.2 u		0.0	57	0.0	0	2.2	0.0	0.0	0	210	14	0
CS-C04-520	May-90	1.2 u		0.0				0.0	0.6	0.0				0
CS-C05-160	Mar-91	1.2 u		0.0	75	0.0	0	1.1	0.0	1.6	0	71	17	0
CS-C05-160	May-90	1.2 u		0.0				0.0	0.4	0.0			T = T	8
CS-C05-290	Mar-91	1.2 u		0.0	158	0.0	0	1.1	0.0	2.2	0	72	16	9
CS-C05-290	May-90	1.2 u		0.0				0.0	0.0	0.0				12
CS-C06-185	May-90	1.2 u		0.0				0.0	0.5	0.0				8
CS-C06-278	May-90	1.2 u												
CS-VPB-01	Feb-91	1.2 u		0.0	92	0.0	0	0.0	0.5	0.0	0	8	16	23
CS-VPB-01	Sep-90	1.2 u												
CS-VPB-01	Jan-90	1.2 u												
CS-VPB-02	Sep-90	1.2 u		0.0		0.0	0	0.0	0.0	0.0	0			11
S-VPB-02	Jan-90	1.2 ບ												}
CS-VPB-03	Jan-91	1.2 u		0.0		0.0	0	0.0	0.0	0.0	0	1		8
CS-VPB-04	Apr-91	1.2 u		2.2	116	0.0	28	14.0	0.0	0.0	0	8	13	5
CS-VPB-04	Sep-90	1.2 u		18.0		0.0	0	0.0	0.0	0.0	0			28
S-VPB-04	May-90	1.2 u		0.0		0.0	70	0.0	0.0	0.0	0			28
S-VPB-04	Jan-90	1.2 u												T
S-VPB-05	Feb-91	1.2 u		0.0	124	0.0	17	0.0	0.3	0.0	0	8	15	14
CS-VPB-05	Sep-90	1.2 u		11.0		0.0	0	0.0	0.0	0.0	0			40
S-VPB-05	May-90	1.2 u		0.0		0.0	0	0.0	0.8	0.0	0	T - T	T = T	8
S-VPB-05	Jan-90	1.2 u												
S-VPB-06	Feb-91	1.2 u		0.0	43	0.0	9	0.0	0.5	0.0	0	24	11	35
S-VPB-06	Sep-90	1.2 u		7.0		0.0	0	0.0	0.0	0.0	0			48
S-VPB-06	May-90	1.2 u	1	0.0		0.0	0	0.0	3.4	• 0.0	0	1		19
CS-VPB-06	Jan-90	1.2 u				1	1			1			T	1
S-VPB-07	Feb-91	1.2 u		0.0	123	0.0	7	0.0	0.4	0.0	0	25	17	8
S-VPB-07	Sep-90	1.2 u		16.0	1	0.0	0	0.0	0.0	0.0	0	1	1	0
S-VPB-07	Jan-90	1.2 u			1		1		\top			1	1 1	T
S-VPB-08	Feb-91	1.2 u		0.0	153	0.0	9	0.0	0.5	0.0	0	9	11	4
S-VPB-08	Sep-90	1.2 u		0.0	1 1	0.0	0	0.0	0.0	0.0	0	1	1-1	20
S-VPB-08	Jan-90	1.2 u			 			1	1				1	
S-VPB-09	Sep-90	1.2 u		0.0	 	0.0	0	0.0	0.0	0.0	0		1	22
S-VPB-09	Jan-90	1.2 u			- -	11	1 1	1-1	1		 	 	1	1

TABLE 3

Glendale Stud	y Area, Nor	tn Uperat	Die Unit A	rea Mei	tais	Pata	\dashv		H	 	\vdash	ļ	╀	<u> </u>	╀		╀	 			\vdash		+	
	 	Filt.		Primar	MC	CLa					 		 ***	 	 	 	 	Seconda	L.	MCI s	-	L	╀	
Well	Date	Size	 	As	10000	Ba	m	Cd		Cr	;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;	РЬ)*** 	На	T***	Se	7	Cu	'	Fe	╁╌	Mn	╁╌	Zn
	- 50.0	- 5125	>MCL	50	╁	1,000	Н	10	Н	50	├-	50	╁	2	╁	10	╁	1,000	Н	300	\vdash	50	+-	5.000
		· · ·	1		T		П				T		┢		1		T		П		T		1	<u> </u>
CS-VPB-10	Sep-90	1.2 u		0.0	П		П	0.0		0	Γ	0.0	Τ	0.2	T	0.0	Τ	0	П				1	13
CS-VPB-10	Jan-90	1.2 u			\sqcap		П				Τ		Π		Τ		T		П		İ		T	· · · · · · · · · · · · · · · · · · ·
CS-VPB-11	Sep-90	1.2 u		0.0	\sqcap			0.0		0	Τ	0.0	1	0.0		0.0	Т	0					T	43
CS-VPB-11	Jan-90	1.2 u	1		\sqcap		П						Γ				Τ		П		Γ			
CS-C03-325	Apr-91	1.2u		1.0	П	74	П	0.0		0		0.0	_	0.0	Τ	0.0	T	0		113		21	T	33
Unfiltered Ana	lyses:						П				Γ		Γ		Τ						Г			
CS-C03-100	Apr-91	Unfilt	2	3.1	П	358	П	0.0		29		5.1	Γ	0.0	Π	2.5	Γ	15		28,100	•	286	•	78
CS-C03-325	Apr-91	Unfilt	2	0.0	П	127	П	0.0		24	Г	2.1	Γ	0.0	Π	1.0	Γ	10		23,200	•	295	•	112
CS-C03-465	Apr-91	Unfilt	2	0.0		147	П	0.0		24	Γ	2.0	П	0.0	Г	0.0	Г	14	\Box	31,800	•	307	•	154
CS-C03-550	Apr-91	Unfilt	2	1.0	П	71	П	0.0		0		4.4		0.0		0.0		49		12,800	•	135	•	89
CS-C04-290	Mar-91	Unfilt	2	1.4	П	126	П	0.0		14		6.5		0.0		1.1		5		12,200	•	218	•	48
CS-C04-382	Mar-91	Unfilt	2	1.2		94	П	0.0		0		1.4	Γ	0.0		1.7	Г	0	П	8,720	•	96	•	28
CS-C04-520	Mar-91	Unfilt	2	0.0		69	П	0.0		0		1.0		0.0	Τ	0.0		0		8,570	•	86	•	15
CS-VPB-01	Sep-89	Unfilt	1	95.0	•		П	6.0		99	•	55.0	•	3.4	•	0.0	Г	58			П			94
CS-VPB-02	Sep-89	Unfilt	1	50.0	•			0.0		49		15.0		0.0		0.0		70		-	П		П	110
CS-VPB-04	Sep-89	Unfilt	1	89.0	•		П	0.0		56	•	0.0	П	0.0		0.0	Γ	39	\exists					55
CS-VPB-05	Sep-89	Unfilt	1	33.0			П	14.0	•	60	•	0.0		0.0		0.0	Γ	75					Ħ	110
CS-VPB-06	Sep-89	Unfilt	1	25.0	П		П	0.0		26		0.0		1.4		0.0	Γ	32	\neg		П		П	65
CS-VPB-08	Sep-89	Unfilt	1	59.0	•			0.0	٦	72	•	10.0	П	3.5	•	19.0	•	100	╗		П			120
CS-VPB-09	Sep-89	Unfilt	1	85.0	•			0.0		120	•	8.0		0.0	Г	0.0	Г	82			П		Г	220
CS-VPB-10	Sep-89	Unfilt	1	39.0			`	6.0	T	73	•	10.0		0.0		18.0	•	63	\neg		П		П	160
CS-VPB-11	Sep-89	Unfilt	1	115.0	•		\Box	0.0		83	•	25.0	П	0.0		0.0		78						240
Notes:	All values	in ual	<u> </u>		-	{	+		\dashv		Н		Н	' . 	Н		H		\dashv		Н		Н	
	"G" wells		dviaw w	elle and	976	sometin	nee	refer	 6d	to as "	GV	/ *	Н		H				┪		Н		H	
	"CS" - Cr				4,0	2011181311		101011	30	to 43		,	Н		Н		H		\dashv		\vdash		Н	
	"*" - dene				ve N	MCL	+		1		Н		$ \cdot $		Н				+				H	
·	"1" - dene						nar	y MCL	. 1		П		\exists		П		П		ヿ		\Box		П	
	"2" - dene								_	4	ш		لب			MCL In			-†		\Box		Н	

APPENDIX A

11 1.C.

VEAR

`	YEAR																			•									'
	OCA	FICH	Cri	pla	ls	pri	20,0	#5	<u>15</u>		_ c	HEM	CAL	ANA	LYS	ES	(P.F	.м.) He	avy l	leta 1	s						_	
Date														Zn										İ		4		-	=
129/78	688	0.V	0.1	٥.7	(002	101	.03	,০প্ত	₹0/	.02	3	.005 005	ري.	.02	õ	0.7													
13/79	896	.01	ر ۱۰	0.6	·50.3	31	.62	.03	10,	.01	5,	\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	501	.01	2.6	0.8													_
7/27/11	RIOD	ده.	0.1		.002	< 10.	< 2	.04	۷ ۱ و ا	.01	4,	8. V	V .01	,01	40				·										_
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YEAR

LOCATION Crustal Spinger Well# 46 CHEMICAL ANALYSES (P.P.M.) Heavy Metals As Ba Br cd Cr Cu I Pb Mn Ppb Se Ag Zn call roc Lab Date 124/77 8507 .6 10.10.8 .602 .61 .62 .06 .61 .02 .1 .63 .01 .18 .0 13/79 878 .ci c. 1 0.5 . 602 . 51 . 602 . 01 . 61 . 61 . 63 . 61 . 01 . 60 2.1 - 01 E0. 10. 600 1. 10. 10. 20. 60. 10. 200 10. 1003 501.03 1.0 -(29/81 RIGT .01 0.1 0.5 002 .01 .02 .03 .01 .01 .1 .03 .01 4.03 1.0 X 1.10.52 2219 6.01 0.10 0.82 6.002 6.01 0.01 0.034 6.01 6.01 6.1 0.004 6.01 6.01 6.0

SANITARY EKGIN CRING DIVISION

.004 YEAR LOCATION Cryptal Springs #50 CHEMICAL ANALYSES (P.P.M.) Heavy Metals Lab As Ba Br Cd Cr Cu I Pb Mn ppi Se Ag Zn cad roc. Lab $^{\circ}_{\mathcal{L}}$ Date 13/79 R97 C1 0.1 0.8 .502 .61 .62 .05 .01 .03 61 .03 .01 .02 2.7 1.0

CCI. STATE DEPT. OF PUBLIC HEALTH

NONTCOKERT LABORATORIES
Division of James H. Hontgomery,
Consulting Engineers, Inc.

TITLE 22 CHENICAL ANALYSES

Date of Report	114/89	Lab Sample ID No	J	50839	
Laboratory				ng S. Bon	L
Name Montgome	YU 405	Director K	<u>wash</u>	445.00	
Name of Sampler Date/Time Sample	\mathcal{O}	Employed By		9	
Date/Time Sample	Date/Time	Sample -/ /		Vere Roldin)£
Collected 5/15/89		Saaple 5/15/89	j	Times Obser	
System City of Gle	ndale			System Number	
Description of	TICK!O		1	MOROEL	
Sampling Point					
Name/No. of Sample	transl 1	Station			**************************************
Source GV	well I	Number	\perp		
Date & Time of Sample		User ID	ubai	tted to SVO	15 By
1819101511151 1 1 1	T G/S			-	-
YYKKDDTTT	T G/S				
	1		~		Malk
MCL REPORTING	CONST	TITUENT	1	STORET	ANALYSES
UNITS			7	CODE	RESULTS
المنار .	Analyzing Agency	(Laboratory)		28	19590
ag/L	Total Bardness (as	CaCO3)		900	1209-
/ mg/L	Calcium (Ca)			916	56.2
mg/L	Magnesium (Mg) -			927	1/6.3
mg/L	Sodium (Na)		1	929	36-0
mg/L	Potassium (K)			937	1 2 3
Total Cations	meq/L Value: 6.	66	1		
mg/L	Total Alkalinity	A. C.CO.	1	410	111190
ag/L	Hydroxide (OH)	82 00001	╅╼┨	71830	
70/6	Carbonate (CO3)		╂╾╌	445	0.00
3.2 L	ibicatognate (#CO3)		} !		
a mg/L	Sulfate (SO4)	<u> </u>	╂╼┤	945	230
ag/L -	Chloride (Cl)		+1	. 940	56
45 eg/L	Nitrate (NO3) ·		-		43
	Plustide (NOS)	Daniel	4-4	71850	1/8-48-
A Transport of the last of the	Fluoride (F) Temp.		4	931	0.44
Total Anions	seq/L Value: 6.	21	7		
Std Units	pB (Laboratory)			403	17.8
## usho/cm .	Specific Conductar	ice (E.C.)	1	95	640
	Total filterable	lesidue			te e januari e e ja
ttt ag/L .	at 180 deg C (1	(201		70300	390
UNITS	Apparent Color (Ur	ifiltered)		81	
Ton	Odor Threshold at	60 deg C		86	
UTN	Lab furbidity		1-1	82079	
0.5 mg/L .	HBAS (1-1	38260	20.02
<u> 250-500-60</u>	20 ** 90	0-1600-2200		*** 500-1	000-1500

COI STATE DEPT, OF PUBLIC HEALTH 13

NONTGONERT LABORATORIES Division of James M. Hontgomery, Consulting Engineers, Inc.

SYSTEM NAME & NUMBER: 1 City of Glendale GV Well 1

* THE FOLLOWING CONSTITUENTS ARE REPORTED IN UG/L .

HCL	REPORTING UNITS	CONSTITUENT	1	STORET	ANALYSES RESULTS
50	ug/L	Arsenic (As)		1002	ा । या
1000	ug/L	Barium (Ba)		1007	130
10	Ug/L	Cadalua (Cd)		1027	27
30	ug/L	Chronium (Total Cr)		1034	ा ८ इ
1000	ug/L+	Copper (Cu)		1042	13
300	ug/L+	Iron (Fe)		1045	1420
50	ug/L	Lead (Pb)		. 1051	ा । । । य
50	Ug/L+	Manganese (Mn)		1055	1774
2	ug/L	Hercury (Hg)		71900	120.2
10	ug/L	Selenium (Se)		1147	1114/1
50	ug/L	Silver (Ag)		1077	111/1
5000	ug/L	Zinc (Zn)		1092	11127

ORGANIC CHEMICALS

0.2 ug	71	Endrin	39390	
4 US		Lindane	39340	
100 ug	/L	Methoxychlor	39480	
5 ug	71	Toxaphene	39400	
100 ug	/L	2,4-0	39730	
	1/1	2,4,5-TP Silvex	39045	
	Date	ORGANIC Analyses Completed	73672	

ADDITIONAL ANALISES

עזא [Field Turbidity	82078	
C	Source Temperature	10	
	Langelier Index Source Temp. Langelier Index at 60 deg C	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Pield off	00400	
	Aggressiveness Index	82383	
eg/L	Aggressiveness Index Silica	00955	
mg/L	Phosphate	00650	
ag/L	Iodide	71865	
	Sodium Absorption Ratio	00931	
	Asbestos	81855	
mo/L	aluminum		
7			720.L
		1	
		1	
1		7	
1		1	

CC STATE DEPT, OF PUBLIC HEALTH 1/3/

HONTGOMERT LABORATORIES Division of James N. Hontgomery, Consulting Engineers, Inc.

TITLE 22 CHEMICAL ANALYSES

Sampler System System System System System System Sampling Point Sampling Point Sampling Point Sampling Point Sampling Point Sampling Point Sampler Sampling Point Sampling Point Sampling Point Sampling Point Sampler Station Source System System System System System Source Sitation Source Station Source Station Source Station Submitted to SVOIS By Sampling Point Station Source Sampler Submitted to SVOIS By Sampling Point Station Source Submitted to SVOIS By Sampling Point Submitted to SVOIS By Submitted Submitted to SVOIS By Submitted Submitted to SVOIS By Submitted	nate of Kebort	6/14/89	J50838	
Sampler Date/Time Sample Date/Time Sample Date/Time Sample Date/Time Sample Date/Time Sample Date/Time Sample Times Observed? YES	Laboratory	Signature La	<u> </u>	<i>k</i> -
Employed By	Name Moniocm	CAN LUST COLOR	Bunkey 3.00	mer.
Date/Time Sample				
System System System System System System System System System System Starpling Point Starlon Source System	Date/Time Sample -	Date/Time Sample	Vere Holdin	Z Z
System System System System System System System System System System Starpling Point Starlon Source System	Collected 5/1	15/89 Received at Lab	Times Obser	ved? YES
Number N	**************		brodestrypyrddrffi Balau?!	*********
Description of Sample	Name City of C	ilendale		
Station	Description of			
Source	Sampling Point	- Istation		
Date & Time of Sample		V Well 2 Number	1111111	111111
MCL REPORTING	Date & Time of Samp	e Vater Type User ID	Subaltted to SVO	IS By
HCL REPORTING	181910151115111		ļ	
Analyzing Agency (Laboratory) 28 7 5 9	YYNNDDTTI	T G/S		
Analyzing Agency (Laboratory) 28 7 5 9	MCL REPORTING	I CONSTITUENT	IT STORET	ANALYSES T
mg/L Total Hardness (as CaCO3) 900 1/6 mg/L Calcium (Ca) 916 4/3 mg/L Hagnesium (Hg) 927 1/0 mg/L Sodium (Na) 929 5/7 mg/L Potassium (K) 937 3 Total Cations meq/L Value: 5/9 mg/L Hydroxide (OH) 71830 6/6 6/6 mg/L Hydroxide (OH) 71830 6/6 6/6 mg/L Garbonate (CO3) 445 6/6 mg/L Suifate (SO4) 945 6/6 mg/L Suifate (SO4) 945 6/6 mg/L Chloride (C1) 940 3/6 45 mg/L Nitrate (NO3) 71850 1/6 1.6-2.4 mg/L Fluoride (F) Temp. Depend. 951 6/6 Total Anions meq/L Value: 5.72 Std Units pH (Laboratory) 403 7/6 at 180 deg C (TD5) 70300 9/6 TON Odor Threshold at 60 deg C 86 1/6 NTU Lab Turbidity 82079 1/6 O.5 mg/L HBAS 38260 6/6 6/6 O.5 mg/L HBAS 4/6 O.5 mg/L HBAS 4/6 O.5			V - V - V	
mg/L Total Hardness (as CaCO3) 900 1/6 mg/L Calcium (Ca) 916 4/3 mg/L Hagnesium (Hg) 927 1/0 mg/L Sodium (Na) 929 5/7 mg/L Potassium (K) 937 3 Total Cations meq/L Value: 5/9 mg/L Hydroxide (OH) 71830 6/6 6/6 mg/L Hydroxide (OH) 71830 6/6 6/6 mg/L Garbonate (CO3) 445 6/6 mg/L Suifate (SO4) 945 6/6 mg/L Suifate (SO4) 945 6/6 mg/L Chloride (C1) 940 3/6 45 mg/L Nitrate (NO3) 71850 1/6 1.6-2.4 mg/L Fluoride (F) Temp. Depend. 951 6/6 Total Anions meq/L Value: 5.72 Std Units pH (Laboratory) 403 7/6 at 180 deg C (TD5) 70300 9/6 TON Odor Threshold at 60 deg C 86 1/6 NTU Lab Turbidity 82079 1/6 O.5 mg/L HBAS 38260 6/6 6/6 O.5 mg/L HBAS 4/6 O.5 mg/L HBAS 4/6 O.5				
mg/L Calcium (Ca) 916 4/3 . mg/L Magnesium (Mg) 927 1/0 . mg/L Sodium (Na) 929 5/7 . mg/L Potassium (K) 937 3 . Total Cations meq/L Value: 5.9 mg/L Hydroxide (OH) 71830 6/10 . mg/L Hydroxide (OH) 71830 6/10 . mg/L Carbonare (CO3) 445 6/10 . mg/L Sicarbonare (ECO3) 445 6/10 . mg/L Sicarbonare (ECO3) 445 6/10 . mg/L Solfate (SO4) 945 16/10 . mg/L Chloride (C1) 940 3/10 . 45 mg/L Chloride (C1) 940 3/10 . 1.4-2.4 mg/L Fluoride (F) Temp. Depend. 951 6/10 . Total Anions meq/L Value: 5.72. Std Units pH (Laboratory) 403 7/1. as umho/cm Specific Conductance (E.C.) 95 5/10 . Total filterable Residue 100 100 100 100 100 mg/L	Analyzing Agency (Laboratory)			
mg/L Hagnesium (Hg) 927 70 mg/L Sodium (Na) 929 57 70 mg/L Potassium (K) 937 3 3 5 5 5 5 5 5 5 5	mg/L	Total Hardness (as CaCUS)		169
mg/L Sodium (Na) 929 57. mg/L Potassium (K) 937 3. Total Cations meq/L Value: 5.9	ag/L			70.6
mg/L Potassium (K) 937 3 3 4 5 5 5 5 5 5 5 5 5	mg/L			57.5
mg/L Total Alkalinity (as CaCO3) 410 7/7	ag/L			
mg/L Hydroxide (OH) 71830 C C C C C C C C C	Total Cations	meq/L Value: 5.9		
mg/L Hydroxide (OH) 71830 C C C C C C C C C		There Whelle In the Cocol	1 1 10	7/2/61
Carbonate (CO3)	90/1			
### ### ##############################	79/1			0.84
### mg/L . Sulfate (SO4) 945 6 # mg/L . Chloride (Cl) 940 3 ### mg/L . Nitrate (NO3) 71850 766. Std Units pH (Laboratory) 951 6.5 ### mg/L . Specific Conductance (E.C.) 95 56 ### mg/L . Specific Conductance (E.C.) 95 56 ### mg/L . Sat 180 deg C (TDS) 70300 56 UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab Turbidity 82079 56.5	IZ L			206
45 ag/L	a mg/L •	Sulfate (SO4)		62
1.4-2.4 mg/L Fluoride (F) Temp. Depend. 951 C. 4 Total Anions meq/L Value: 5.72 Std Units pH (Laboratory) 403 7. ## umho/cm • Specific Conductance (E.C.) 95 56 Total Filterable Residue ### mg/L • at 180 deg C (TD\$) 70300 95 UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab furbidity 82079 O.5 mg/L • MBAS 38260 C 0.0				30
Std Units pH (Laboratory) 403 7.				10.12
Std Units pH (Laboratory) ** umho/cm • Specific Conductance (E.C.) fotal filterable Residue *** mg/L • ** at 180 deg C (TDS) UNITS Apparent Color (Unfiltered) TON Odor Threshold at 60 deg C NTU Lab furbidity 0.5 mg/L • MBAS 403 70. 5 6 85 60 70300 81 81 80 80 80 80 80 80 80	114-2.4 Mg/L		321	1 Kil. 1717
## umho/cm • Specific Conductance (E.C.) 95 56 Total filterable Residue ### mg/L • Set 190 deg C (TDS) 70300 55 UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab Turbidity 82079 O.5 mg/L • MBAS 38260 00.0	10001 10113	Beyld Tarder 5.12	<u>_</u>	
## umho/cm • Specific Conductance (E.C.) 95 56 Total filterable Residue ### mg/L • Set 190 deg C (TDS) 70300 55 UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab Turbidity 82079 O.5 mg/L • MBAS 38260 00.0	Std Units	p8 (Laboratory)	403	7.18
### mg/L • % at 180 deg C (TDS) 70300 55 UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab furbidity 82079 0.5 mg/L • MBAS 38260 00.0		Specific Conductance (E.C.)	95	565
UNITS Apparent Color (Unfiltered) 81 TON Odor Threshold at 60 deg C 86 NTU Lab Turbidity 82079 O.5 mg/L NBAS 38260		Total filterable Residue	100	
TON Odor Threshold at 60 deg C 86 NTU Lab furbidity 82079 0.5 mg/L MBAS 38260 0.0		at 180 deg C (TDS)		350
NTU Lab Turbidity 82079 0.5 mg/L • HBAS 38260 0.0		Apparent Color (Unilitered)		┃┃┃┩┩╸
0.5 mg/L • MBAS 38260 20.0		Coot intesuord st on des C		┠╼╂╼╏═╏═╏ ═
				20.02
* 250-500-600				200-1300

CCI. STATE DEPT. OF PUBLIC HEALTH 1/3/3

NONTCOMERT LABORATORIES Division of James M. Montgomery, Consulting Engineers, Inc.

SYSTEM NAME & NUMBER: 1 City of Glendale GV Well 2

* THE FOLLOVING CONSTITUENTS ARE REPORTED IN UG/L *

HCL	HCL REPORTING CONSTITUENT UNITS		1	STORET CODE	ANALYSES RESULTS
50	Ug/L	Arsenic (As)		1005	11141
1000	ug/L	Barium (Ba)		1007	।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।।
10	ug/L	Cadeius (Cd)		1027	11121
50	ug/L	Chromium (Total Cr)		1034	111 रड
1000	ug/L.	Copper (Cu)		1042	17179
300	ug/L+	Iron (Fe)	-1	1045	11220
50	ug/L	Lead (Pb)		1051	1 2
50	ug/L+	Manganese (Mn)		1035	112/4
2	ug/L	Hercury (Hg)		71900	120.2
10	ug/L	Selenium (Se)		1147	
50	ug/L	Silver (Ag)		1077	निना यग
3000	ug/L	Zinc (2n)]	1092	नि नियम

ORGANIC CEEXICALS

0.2	. ug/L	Endrin	39390	Π	T.			_
4	Ug/L	Lindane	39340	IT	Т	П	T	_
100	Ug/L	Methoxychlor	39480	TT	T	П	Ţ	
	UZ/L	Toxaphene	39400	П	T	П	\exists	_
100	ug/L	2,4-0	39730	\prod	T	П	\Box	
10	ug/L	2,4,5-TP Silvex	39045		T	П	T	
		Date ORGANIC Analyses Completed	73672			П		_
				7	H	H	5	Ď

ADDITIONAL ANALYSES

HIU	Field Turbidity	82078	
C	Source Temperature	10	
	Langelier Index Source Temp. Langelier Index at 60 deg C	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Field pH	00400	
	Aggressiveness Index	82383	
mg/L	Silica	00955	
mg/L	Phosphate	00650	
ag/L	lodide	71865	
	Sodius Absorption Ratio	00931	
	Asbestos	81855	
mod L	Zluminum		
7			160.1
	•		

CCI STATE DEPT. OF PUBLIC HEALTH 7/3/51 HONTCONERT LABORATORIES

Division of James M. Montgomery, Consulting Engineers, Inc.

TITLE 22 CERNICAL ANALYSES

Date of Report	114/89	Lab Sample ID No	· J0	583	4
Laboratory		Signature Lab	•		7
Nese Montgom	W Labs	Director K	youla	45.6	Sach
Name of U		Sembras		1	
Sampler	10010/2100	Sample 5/15/89	1112		
Date/Time Sample 5/15/	89 Received	Sample 5/15/00	1462	e Holdin	ved? YES
Collected 412	94 Ivacetage	1 140 /15/87	1484	62 00261	A601 152
	######################################		leva	tes	***********
System City of	Glendale.		Num		
Description of	0,611014.0		1100	061	
Talling Bodon					
Name/No. of Sample G		Station			
Source	Well II	Number 1	111	1111	111111
Date & Time of Sample	Vater Type		ubaitte	d to sve	is by
18191015115111	न दि	1 1111			•
TTTOOKHYT	₹ <u>6/\$</u>				·
HCL REPORTING	CONS	TITUENT		TORET	ANALYSES
UNITS			T	CODE	RESULTS
					.0.5.0.5
	Analyzing Agency	(Laboratory)		28	11915910
mg/L	Total Mardness (a	s CaC03)	1	900	1185
mg/L	Calcius (Ca)	~~~	 	916	- इस- इ
mg/L	Magnesium (Ng)		 - - - - - - - - -	927	प्राप्त ।
mg/L	Sodium (Na)		├ -├-	929	13719
mg/L	Potassium (K)		} ─┴─	937	3.5
Total Cations	meq/L Value: 5	5.15	1		
ug/L	Total Alkalinity	(se CeCO3)	, , , , , , , , , , , , , , , , , , , 	410	<u>गो जिल्</u> ल
mg/L	Hydroxide (OH)	(85 64603)	┨╌┤╌	1830	1 1 1 1 1 1 1 2 3
-c/L	Carbonate (CO3)		╂╼╂┷	445	9:80
12 L	bicaroonate (nco)	1	∤∼ ┼─		1 2 2 2 3
a ag/L	Sulfate (SO4)	<u>′</u>	} 	945	निस्त्री ।
ng/L	Chloride (C1)		╂┈╂╼╍	940	
45 mg/L	Nitrate (NO3)		1 -	71850	6.60
1.4-2.4 ag/L	Fluoride (P) Temp	. Depend.	 	931	0, 49
Total Anions	seq/L Value: 5.	04	 		
		-17	4		
Std Units	pH (Laboratory)		T	403	11718
** ueho/cm ·	Specific Conducta	nce (E.C.)	1-1-	95	1 1483
	Total filterable	lesidue		· · · · · · · · · · · · · · · · · · ·	· ·
ttt mg/L .	at 180 deg C (TDS)	1	70300	111290
UNITS	Apparent Color (U	nfiltered)		81	
TON	Odor Threshold at	60 deg C		86	
יוא	Lab Turbidity			32079	
0.5 mg/L +	HBAS			38260	0.02
. * 250-500-60	20 ** 9	00-1600-2200	A 1	** 500-1	000-1500

CCI STATE DEPL DE RUBIG MEALTS 7/3/59

NONTGONERY LABORATORIES Division of James H. Hontgomery, Consulting Engineers, Inc.

SYSTEM HAME & MUMBER: I City of Glendale GV Well 11

* THE FOLLOVING CONSTITUENTS ARE REPORTED IN UG/L *

HCL	reporting Units	CONSTITUENT	1	STORET	Analyses Results
50	Ug/L	Arsenic (As)		1002	1121
1000	ug/L	Barium (Ba)		1007	8.5
10	ug/L	Cadajum (Cd)		1027	17/
50	ug/L	Chromium (Total Cr)		1034	1 2 5
1000	ug/L+	Copper (Cu)		1042	1 30
300	ug/L+	Iron (fe)	-	1045	< 50 C
50 ·	ug/L	Lead (Pb)		1051	1 2 2
50	ug/L+	Manganese (Mn)		1055	214
2	ug/L	Mercury (Hg)		71900	20.2
10	ug/L	Selenium (Se)		1147	
50	ug/L	Silver (Ag)		1077	
5000	ug/L	Zinc (2n)		1092	

ORGANIC CHEMICALS

0.2	ug/L	Endrin	39390		П	J	
4	ug/L	Lindane	39340			Т	
100	Ug/L	Methoxychlor	39480		П	Т	7
	Ug/L	Toxaphene	39400		П	1	
100	Ug/L	[2,4-D	39730		\prod	${\mathbb T}$	T
10	ug/L	2,4,5-TP Silvex	39045		\Box	T	\Box
		Date ORGANIC Analyses Completed	73672			T	\mathbf{I}
				77	1	7	7

ADDITIONAL ANALYSES

NTU	Field Turbidity	82078	
Ċ	Source Temperature	10	
	Langelier Index Source Temp. Langelier Index at 60 deg C	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Field of	00400	
	Aggressiveness Index Silica	82383	
eg/L	Silica	00953	
eg/L	Phosphate	00650	
mg/L	Iodide	71865	
	Sodium Absorption Ratio	00931	
	Asbestos	81855	
malL	aluminum		10.01
U			
			11-11
		1	

CC STATE DEPT. OF MUBLIC HEALTH

HONTCOKERT LABORATORIES
Division of James N. Montgomery,
Consulting Engineers, Inc.

TITLE 22 CHENICAL ANALTSES

1/31/5/ Baker

Date of Report 6/20	189	Lab Sample ID #	·· 1	51159	
Tabasa tasw		Signature Lab		erly S. Ba	
Hame Montaging	AN LAID	Director of	M16	erego Do	
Name of	U	Sampler Employed By			
Sampler	Date/Time	Caployed by		Vere Boldin	
Date/Time Sample 5/16	109 Pacaluad	at Lab 5/16/89	- 1	Times Obser	
Collected 5/16	A IVECETIES	0116137		11465 00361	1401 123
System				System	
Name Glandale			•	Number	
Description of					
Sampling Point					
Wana / Canala	4	Station			
Source	V Well #12	Number			111111
Date & Time of Sample	Vater Type	User ID	Suba.	tted to SV	IS By
18191951161111	1 61,8				
YYKKDDTTT	f G/\$				
HCL REPORTING	CONS	TITUENT	T	STORET	ANALYSES
UNITS		~	T	COOR	RESULTS
		40.5	Į		1 101 001
	Analyzing Agency	(Laboratory)		28	1915990
mg/L	Total Hardness (a	s CaCO3)	_}_	900	257
Bg/L	Calcium (Ca)	· · · · · · · · · · · · · · · · · · ·		916	74.7
ag/L	Hagnesium (Mg)			927	. 16.6
mg/L	Sodium (Na)			929	44.7
mg/L	Potassium (X)		~}~	937	114.6
Total Cations	meq/L Value: 7.	19			
	Total Alkalinity	(a. C.CO3)		410	TTTTTT
ug/L	Hydroxide (OH)	(85 CEC03)		71830	1190
mg/L	Carbonate (CO)			445	0.00
72/1	Sicarbonate (NCO)			1 450	
3 L	Sulfate (SO4))	-}-	945	2281
76,0	Chloride (CI)			940	- - - - - - - - - -
	Nitrate (NO3)		- -	71850	181. 712
1 7 7 7 7	Price (NOS)	Danand		951	
Total Anions	Fluoride (F) Temp meq/L Value:	· rebelia.		771	LLCONT
Trofer Willous	BOALD ARTRAL	6.96	ل ــ		
Std Valts	pB (Laboratory)		7	403	1118111
** usho/cm +	Specific Conducta	nce (E.C.)		795	। । । । । ।
1	Total Filterable	Residue			1191000
ttt mg/L .	at 180 deg C (T	70300	11/4/201
UNITS	Apparent Color (U	ntilitaredi		81	 - - - 77774
TON	Odor Threshold at	60 deg C		86	╂╂┼┼┼┼
ענאר וויי	Lab Turbidity	***************************************		82079	┨╸╏ ╶╏╌╂╌╂╌╃╌╃═╋
0.5 mg/L -	HBAS			38260	20,02
\$ 250-500-60		00-1600-2200		+++ 500-1	
- 634-344-44	- -	: ' ann- e e an		200-1	404-1044

CCI STATE DEPT. OF BUSING HEALTH 7/3/89

NONTGONERY LABORATORIES Division of James H. Montgomery, Consulting Engineers, Inc.

SYSTEM HAME & MUMBER: \ Glandale GV Well # 12

* THE FOLLOVING CONSTITUENTS ARE REPORTED IN UG/L *

	reporting Units	CONSTITUENT	1	STORET	ANALYSES RESULTS
50	ug/L	Arsenic (As)		1002	147
1000	ug/L	Barium (Ba)		1007	64
10	Ug/L	Cadaium (Cd)		1027	27
30	Ug/L	Chromium (Total Cr)		1034	25
1000	Ug/L+	Copper (Cu)		1042	7/7
300	ug/L+	Iron (fe)	- 1	1045	27
30	ug/L	Lead (Pb)		1051	5
50	ug/L+	Manganese (Mn)		1055	14/14
2	ug/L	Mercury (Hg) -		71900	20.2
10	Ug/L	Selenium (Se)		1147	
50	ug/L	Silver (Ag)		1077	1112/
3000	ug/L	(2inc (2n)		1092	11/12

ORGANIC CEENICALS

				YY	H H	D
		Date ORGANIC Analyses Completed	73672		\Box	L
10	ug/L	2,4,5-TP Silvex	39045	\prod	\Box	${f L}$
100	ug/L	2,4-D	39730			${\mathbb L}$
5	ug/L	Toxaphene	39400	Π		${f L}$
100	ug/L	Methoxychlor	39480		\coprod	L
	ug/L	Lindane	39340			上
0.2	Ug/L	Endrin	39390			Ļ

ADDITIONAL ANALYSES

טזא	Field Turbidity	82078	I	\prod		
C	Source Temperature	10	\mathbb{I}	Π		
	Langelier Index Source Temp.	71814		П		
	Langelier Index at 60 deg C	71813	\mathbf{I}	\coprod		
Std. Units	Field pH	00400		Π		
	Aggressiveness Index	82383		Π		L
mg/L	Silica	00955		Π		L
eg/L	Phosphate	00650		Π		
mg/L	Iodide	71865	\perp	Π	1	L
	Sodium Absorption Ratio	00931		${f II}$	\perp	L
	Asbestos	81855	\Box	\Box		L
mo/L	aluminum		\perp	14	<u>a.</u>	1/
v				Π		1_
				Π	\perp	1
			٦.	Π	1	L
			Π-	Π	L	L
		.:	\top	Π	$oldsymbol{ol}}}}}}}}}}}}}}$	\perp
			T	Π	1_	1
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			\Box			1
			$\neg \Gamma$	77		

HONTGOMERY LABORATORIES Division of Jeses M. Montgomery, Consulting Engineers, Inc.

TITLE 22 CEENICAL ANALYSES

			1-6-6	1 - VK U		^	
Date of Report 6	. 1	Lab Samp	ord in w	٥.	150833		
Laboratory Montgo	marie 1a	ha	Signatur	e Lab		45.B	a.l.
Name of	micry Le	25	Sampler		LANK	7	
Sampler	U	·	Employed	l By			
	1-	Date/Time	Sample	- / /		Vera Holdl	ng
Collected 5	15/89	Received a	t Lab	5/15/2	39	Times Obse	rved? YBS
Euglan .						System	
vane LIM. G	F Glei	10318			· •·	Mumber	
Description et (Sampling Point)						
Name/No. of Sample	e 01 110	<i>i</i> 1 . 1	Stati				
Source		11.14	Nu≡be				
Date & Time of Sa	mple	Vater Type	Usei	:	Suba	tted to SV	QIS By
<u>। होत्रीतिस्तीश्</u> री	╒╏╤┖ ┲┺	<u> [-]</u> 675	11	44 }			
					.		
HCL REPORTIN	G	CONST	TTUENT		17	STORET	ANALYSES
UNITS					7	CODE	RESULTS
	10074	olna kaanaw /	'l sharata			28	1 1912910
mg/L	Total	zing Agency (Rardness (as	CaCO31	217)	-}-	900	1 1992
ng/L		UR (Ca)	_ 0003/_		-{-	916	57.2
ag/L		slum (Mg)			1	927	1 1/21/19
mg/L	Sodiu					929	159.4
ag/L		slum (K)				937	1 3.5
Total Cations	meq/L	Value: 6.	<u>e</u>				
mg/L	Itotal	Alkalinity (as CaCO	,	7	410	TTTTTT
ng/L		41de (OH)		''		71830	1 10:100
-8/6		nete (CO3)			+-	445	1 101.1814
12.6		ecnate (HCO3)				0	2.00
		te (504)				945	82
		ide (Cl)				940	1 48
45 mg/L 1.4-2.4 mg/L		le (NO3) ide (F) Temp.	Kanad		┩~	71850 951	8.36 0.4/
Total Anions	8eg/L		52	·	-}-	731	1-1-101-171/
			22				
Std Units	PH (L	aboratory)			7_	403	71-181
## Umho/cm	Speci	le Conductan	ce (E.C.	.)		95	1140
*** me/1.	Total	Vilterable N	lesidue	• • •		1-1848	، ماستان بار بار بار بار
### mg/L UNITS	38	180 deg C (1	(VS)			70300	400
TON	Odor	int Color (Un Threshold at	60 700			86	╏ ╋╋
NTU	Lib ti	rbidity	AA AEL		+-	82079	╺╏╸╏┈╏╸╏╺┩╸╏ ╌┫
0.5 ag/L	MBAS					38260	6.05
250-50		** 90	0-1600-	2200		*** 500-	1000-1500

NONTCOMERT LABORATORIES

Division of James H. Hontgomery,
Consulting Engineers, Inc.

SYSTEM NAME & NUMBER: City of Glandale GV Well 14

* THE FOLLOVING CONSTITUENTS ARE REPORTED IN UG/L *

HCL	HCL REPORTING CONSTITUENT UNITS		CONSTITUENT T STORET		ANALYSES RESULTS		
50	ug/L	Arsenic (As)		1002	Π	121	
1000	ug/L	Barium (Ba)		1007		187	
10	ug/L	Cadmium (Cd)		1027	$\Pi \Pi$	1127	
50	ug/L	Chronium (Total Cr)		1034		TKIS	
1000	ug/L+	Copper (Cu)		1042		1 राष्ट्र	
300	ug/L+	Iron (Fe)		1045		116	
50	ug/L	Lead (Pb)		1051		122	
30	ug/L+	Manganese (Mn)		1055		12/14	
2	ug/L	Mercury (Mg)		71900	1772	4012	
10	ug/L	Selenium (Se)		1147		117	
50	ug/L	Silver (Ag)		1077		17217	
5000	ug/L	Zinc (Zn)		1092	$\Pi \Pi$	14/10	

ORGANIC CHEMICALS

0.2	ug/L	Endrin	39390	Π	T	Γ	\square	
4	ug/L	Lindane	39340	$T \perp$	T		\square	
100	ug/L	Methoxychlor	39480	\mathbf{I}	\mathbf{I}		\square	
5	ug/L	Toxaphene	39400	\mathbf{T}	T	\mathbf{I}	Π	_
100	ug/L	2,4-0	39730	Π	\mathcal{T}		\Box	
10	ug/L	2,4,5-TP Silvex	39045			I_{-}		
		Date ORGANIC Analyses Completed	73672	TT		$oxed{\mathbb{T}}$	\Box	
					3 7	Tu	7	ᅕ

ADDITIONAL ANALYSES

UTM	Field Turbidity	82078	
Č	Source Temperature	10	
	Langelier Index Source Temp. Langelier Index at 60 deg C	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Field pH	00400	
	Aggressiveness Index	82383	
ag/L	Sillea	00955	
mg/L	Phosphate	00650	
mg/L	lodide	71865	
	Sodium Absorption Ratio	00931	
	Asbestos	81855	
MalL	aluminiam:		1 40.
V			
			1
			4-1-1-1-1
			┸┹┸┹
			┸┸┸┵
			╂┵┞╌┞╼┞╼┼
			┋ ┋
	dicates Secondary Drinking Water Sta		<u> </u>

CCI STATE DEFT, OF PUBLIC HEALTH 7/3//89

MONTCOMERY LABORATORIES
Division of James N. Montgomery,
Consulting Engineers, Inc.

TITLE 22 CEENICAL ANALYSES

Date of Report 6/14	Lab Sample ID Me Signature Lab	. J	50837	_	
Laboratory.		Signature Lab .			
Name Montanimo	ru Labs i	Director	uml	nes 5. Ba	Jr.
Name of		gentre:		7	
Sampler	Date/Time	Employed By		Wasa Parze	
Date/Time Sample	Received a	1 Leb 5/15/89		Vere Holdis	
Collected 5/15/89	e ositosanj Ambumananj			11842	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
System C.	1 4			System	
Name CITY of GLEI	ndale		• • •	Number	
Description of					
Sampling Point					
Name/No. of Sample	well 15	Station Number	1 1		
Source GV Date & Time of Sample	Vater Type		Sinha	ited to SV	NE NO
1819101511151 1 1	1 1 1/1			11160 10 511	dea nl
1819101511151 1 1 1	1 E/S	i **** i		•	
HCL REPORTING	CONST	ITUENT	11	STORET	ANALYSES
UNITS			I	COOE	RESULTS
	 	! a b a m a a = m	!		1 1916191
 	Analyzing Agency (Total Razdness (as	Cacostory)	-}	900	1 19151919
ag/L	Calcium (Ca)	CaCOS)	- 	916	1 42 3
mg/L	Magnesium (Mg)		+-	927	1 191.191
Bg/L	Sodium (Na)		+	929	183.17
ag/L	Potassium (K)		7	937	1 3 . 17
Total Cations	meq/L Value: (p.	69	T		
Bg/L	Total Alkalinity (as (aCO3)		410	170
mg/L	Bydroxide (OB)	······································		71830	10.00
".g/L	Carbonate (CO3)		<u> </u>	445	17 101.1816
rg·L	Sulfate (SO4)		+	945	1 206
a ng/L	Chloride (Cl)		+-	940	6 4
45 mg/L	Nitrate (NO3)		+-	71850	19.24
1.4-2.4 mg/L	Fluoride (F) Temp.	Depend.	 	951	0.74
Total Anions	meq/L Value: 6.		1		
					
Std Units	pd (Laboratory)	7		403	7.8
## UBho/cm •	Specific Conductan	ce (E.C.)		95	655
ttt ar/L	Total filterable k at 180 deg C (T		-	70300	
units	Apparent Color (Un	Elleredi	+-	81	400
TON	Odor Threshold at	60 der C	+	86	╏╺╏╸╏╸╏╸╏╸ ╂╸╋
ਲਜੰਹ	Lab Turbidity		+-	82079	┨╶┨╶╏╸╏
0.5 mg/L +	HBAS		+	38260	0.02
* 250-500-60	XO ** 90	0-1600-2200		*** 500-1	000-1500
·	:·	•		_	

CCL STATE DEPT. OF PUBLIC HEALTH

7/3//84

HONTGOHERY LABORATORIES Division of James H. Hontgomery, Consulting Engineers, Inc.

SYSTEM NAME & NUMBER: (City of Glandale GV Well 15

* THE FOLLOWING CONSTITUENTS ARE REPORTED IN UG/L *

	HCL REPORTING UNITS			STORET CODE	ANALYSES RESULTS
]	50 Ug/L	Arsenie (As)		1002	1121
	1000 ug/L	Barium (Ba)		1007	नि वित्र
ı 1	10 ug/L	Cadmium (Cd)		1027	
	50 ug/L	Chromium (Total Cr)		1034	1 रिझ
1	1000 ug/L.	Copper (Cu)		1042	11129
, 1	300 ug/L+	Iron (Fe)	1	1045	120
1	50 ug/L	Lead (Pb)		1051	ा । य
¹ 1	50 ug/L+	Manganese (Mn)		1055	1 6 न
1	2 ug/L	Mercury (Mg)		71900	140.12
17	10 ug/L	Selenium (Se)		1147	1112/1
	50 ug/L	Silver (Ag)		1077	
1	5000 ug/L	Zine (Zn)		1092	नि नि

ORGANIC CHEHICALS

0.2	ug/L	Endrin	39390	77	\Box	T	\prod
4	ug/L	Lindane	39340	T	П	T	П
100	Ug/L	Methoxychlor	39480	TT	П	\top	Π
3	ug/L	Toxaphene	39400	TT	П	\Box	\square
100	Ug/L	[2,4-D	39730	TT	TT	T	П
10	ug/L	2.4,5-fP Silvex	39045	Π	П	\top	\prod
		Date ORGANIC Analyses Completed	73672	TT	\Box	\top	\coprod
				Y	T	T	1

ADDITIONAL ANALYSES

טזא	Field Turbidity	82078	
¢	Source Temperature Langelier Index Source Temp. Langelier Index at 60 deg C	10	TTTT
	Langelier Index Source Temp.	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Field pH	00400	
	Aggressiveness Index	82383	
mg/L	Silica	00955	
mg/L mg/L	Phosphate	00650	
ag/L	Iodide Sodium Absorption Ratio	71865	
	Sodium Absorption Ratio	00931	
	Asbestos & Asbestos	81855	
mc/L	aluminum		401.
U			
	·		

7/31/39

HONTGOKERY LABORATORIES Division of James H. Hontgomery, Consulting Engineers, Inc.

TITLE 22 CHEMICAL AMALTSES

Date of Report	4189	Lab Sample ID N	10. JE	50830	•
Laboratory		Signature Lab			
Name Monthomeri	1 Labs	Director	Sunk	4.5.6	3onh
Name of //) .	Sampler			
Sampler Date/Time Sample Collected 5/15/80	, 	Employed By	111		
called Sample	Date/Time	t Leb 5/15/8	Q 17	ere Holdin laes Obser	
Collected 5/19/8.	7 INECESTED	1 40 4/5/8	7	1462 0036	, v u
tue tas			ls	ysten	
Name City of (Siendalu			umber	
Description of					
Sampling Point					
Name/No. of Sample Source	Well 10	Station Number	1 1 1		
Source (1V) Date & Time of Sample	Vater Type		Submit	ted to SV	He Ry
181910191191111					,
ISIGIO A LIGITIE	T G/S	1-1-1-1			
HCL REPORTING	CONS'	TITUENT	14.1	STOKET	ANALYSES
UNITS			171	CODE	RESULTS
	Ann Aug Land Land	(* - 1 · · · · · · · · · · ·		20	19,69,0
ng/L	Analyzing Agency (a: Total Hardness (a:	(Laboratory)	╼╂╾┼	<u>28</u> 900	1 1915919
ag/L	Calcium (Ca)	s (d(U))	╼╂╌┼╸	916	1 5478
mg/L	Magnesium (Mg)	·		927	12.4
mg/L	Sodium (Na)	~ 	1	929	36.11
mg/L	Potassium (K)			937	3.3
Total Cations	meq/L Value: 5.	52,			
	**				
ng/L	Total Alkalinity	(25 (203)	╼╂╼╁╴	410 71830	11-14/2/3
ag/L	Bydroxide (08)		╼╂╼╌╁╼	11830	10.00
72.1	ibicaroonate (800)	<u>, </u>	- } }-	440	2.12
2g/L	Sulfate (\$04)		-1-1	945	11 56
* ag/L -	Chloride (C1)	· · · · · · · · · · · · · · · · · · ·	-+	940	1-
45 ag/L	Nitrate (NO3)			71850	111,44
1.4-2.4 mg/L	Fluoride (f) Temp			951	0.47
Total Anions	seq/L Value: 5.	+7			•
Std Units	Inti // abanasans		- 1 - 1 -	7/03	र राजाना छ
24 Unho/cm +	pH (Laboratory) Specific Conducta	nce (F.C.)	+	403 95	1 620
4-12-5	Total filterable	lesidue			
+++ ag/L	et 180 deg C (TT	70300	1 320
UNITS	Apparent Color (U	nfiltered)	1	81	1-1-1-1-1-1
TON	Odor Threshold at	60 deg C		86	
NTU	Lab furbidity	· · · · · · · · · · · · · · · · · · ·		82079	
0.5 mg/L .	MBAS			38260	0.02
* 250-500-60	00 ±± %	30-1600-2200		*** 500-1	000-1500
- 230-300-0	,	-1000-1500			

CC. STATE DEPT, OF BUBLIC HEALTH

NONTCOMERT LABORATORIES
Division of James M. Hontgomery,
Consulting Engineers, Inc.

SYSTEM NAME & NUMBER: 1 City of Glandale GV Well 16

* THE FOLLOWING CONSTITUENTS ARE REPORTED IN UG/L *

HEL	REPORTING UNITS	CONSTITUENT	7	STORET	ANALYSES RESULTS
50	ug/L	Arsenic (As)		1002	
1000	ug/L	Barium (Ba)		1007	94
10	Ug/L	Cadmium (Cd)		1027	17/
50	ug/L	Chronium (Total Cr)		1034	
1000	ug/L+	Copper (Cu)		1042	74
300	ug/L+	Iron (Fe)		1045	ている
30	ug/L	Lead (Pb)		1051	1 1 1 2 2
50	ug/L+	Hanganese (Hn)		1055	1114
2	ug/L	Mercury (Hg)		71900	20,2
10	ug/L	Selenium (Se)		1147	2/
50	ug/L	Silver (Ag)		1077	
5000	ug/L	Zine (Zn)		1092	110

ORGANIC CHEMICALS

0.2	ug/L	Endrin	39390	$oldsymbol{\perp}$	Π	\perp	\perp
4	ug/L	Lindane	39340		\prod	\perp	$oldsymbol{\perp}$
100	ug/L	Hethoxychlor	39480	T	П	\mathcal{I}	T
3	ug/L	Toxaphene	39400	\Box	Π	${ m I}$	${f I}$
100	Ug/L	2,4-0	39730	\mathbf{T}	Π	\perp	T
10	ug/L	2,4,5-TP Silvex	39045	T	П	m T	\mathbf{I}
		Date ORGANIC Analyses Completed	73672	T	\Box	I	I

ADDITIONAL AMALTSES

Miu	Field Turbidity	82078	TITI
C	Source Temperature Langelier Index Source Temp. Langelier Index at 60 deg C	10	
	Langelier Index Source Teap.	71814	
	Langelier Index at 60 deg C	71813	
Std. Units	Field pH	00400	
	Aggressiveness Index	82383	
ag/L	Silica	00955	
Bg/L	Phosphate	00650	
mg/L	lodide	71865	
	Sodium Absorption Ratio	00931	
	Asbestos	81855.34	
mo/L	aluminum		40.1
		s of de	
		San San San San	
1	V Sacardary Dulable H		

APPENDIX B

CITY OF LOS ANGELES HEADWORKS WELL SUMMARY

Well Name	LAFCD No.	Location	Year Drilled	Capacity (GPM)	Surface Elev.	HP/RPM	Well Diameter (inches)	Total Depth (ft)	Screened Interval Depths (ft)	Status
HW-25	3894BB	400' ± S.W. of Riverside Dr. 75' ± N.W. of Thompson Ave. 80' ± S.W. of Storm Channel	1956	3100	477.3		20	341	105-195, 230-303, 312-323	Inactive, available for future use. Pump pulled.
HW-26	3893L	425' ± S.W. of Riverside Dr. 175' ± N.W. of Irving Ave. 300' ± S.E. of Well 3893K	1956	2100	477.2		20	355	105-173, 194-211, 225-258, 267-306, 312-336	Inactive, available for future use. Pump pulled.
HW-27	3893K	Griffith Park-near end of Allen Ave. (north of L.A. River)	1956	2700	477.9		20	437	104-184, 194-205, 222-252, 267-343, 404-412	Inactive, available for future use. Pump pulled.
HW-28	3893M	approx 400' N.W. of Allen Ave. approx 1295' S. of Riverside Dr.	1967	3600	480.30		20	456	238-445	Inactive, available for future use. Pump pulled.
HW-29	3893N	south of flood channel approx 300' E. of Riverside Dr. and Main Street	1968	3700	480.00		20	495	235-362, 390-450	Inactive, available for future use. Pump pulled.
HW-30	3893P	south side of channel close to Riverside & Main St. 162' from well 3893N	1978	4300	482.7		20	445	165-190, 210-300, 310-400	Inactive, available for future use. Pump pulled.

Source: LADWP, 1991a

CITY OF GLENDALE GRANDVIEW WELL SUMMARY

Well Name	LAFCD No.	Location	Year Drilled	Capacity (GPM)	Surface Elev.	Bowl Elev.	HP (RPM)	Well Diameter (inches)	Total Depth (ft)	Screened Interval Depths (ft)	Status*
GV-I	3913	6115 San Fernando Rd.	1916	1600	470.00	470.31	125	16	500.0	112-115, 153-160, 178-189, 208-217, 250-283, 298-326, 346-355, 380-482	Standby
GV-2	3913A	6135 San Fernando Rd.	1916	1700	471.00	471.32	125	16	500.0	112-122, 146-155, 188-193, 252-284, 308-328, 344-356, 389-460, 468-476	Active
GV-6	3913F	1029 Grand Central Ave. (Vault)	1923		468.00	457.50	150	18	504.0	87-145, 151-200, 229-259, 269-495	To Be Abandoned collapsed casing
GV-11	3903A	800 Western Ave.	1929	2000	488.60	489.93	200	18	494.0 ^b	312-332, 360-372, 394-474 (535-558, 567-607) ^b	Active
GV-12	3914C	508 Paula Ave. (Vault)	1929	2000	468.20	455.76	200	18	534.0	155-184, 188-260, 266-355	Standby
GV-13	3903M	629 Hazel St. (Well and CL ₂ House)	1953	2000	472.60	461.62	200	24	606.0	150-197, 256-270, 312-325, 385-400, 410-538, 545-578	No motor, but operable
GV-14	3903N	N.W. Corner Griffin Manor Park (3119 Flower St.)	1954		483.80	478.80	250	24	619.0	151-191, 235-352, 379-515, 526-552, 567-592	Caved well, not operational
GV-15	3913G	6129 San Fernando Rd.	1961	1500	470.60	470.87	125	20	500.0	258-284, 311-328, 348-360, 380-462	Active

CITY OF GLENDALE **GRANDVIEW WELL SUMMARY** (Continued)

Well Name	LAFCD No.	Location	Year Drilled	Capacity (GPM)	Surface Elev.	Bowl Elev.	HP (RPM)	Well Diameter (inches)	Total Depth (ft)	Screened Interval Depths (ft)	Status*
GV-16	3913H	1424 Airway	1964	1700	477.60	477.98	200	20	550.0	266-282, 286-306, 328-348, 362-390, 394-450, 478-490, 500-526	Standby

Source: Cruz, 1990

* Active denotes that wells are being pumped.

Standby denotes that pumps installed, but must have DHS permission to resume pumping.

b Original total depth of Well G-11 was 640.0. Well was filled with sand to 494 ft. bgs in 1985 due to high sulfur content in groundwater at this depth.

CITY OF LOS ANGELES CRYSTAL SPRINGS WELL SUMMARY

Well Name	LAFCD No.	Location	Year Drilled	Capacity (GPM)	Surface Elev.	HP/RPM	Well Diameter (inches)	Total Depth (ft)	Screened Interval Depths (ft)	Status
CS-44	3914K	487' S.W. of Flower St. 1192' S.E.P.L. Paula Ave.	1927	Monitoring	448.05	75/970	20	296.0	50-68, 70-87, 97-160, 167-185, 209-236, 245-282	Inactive, eventually will be destroyed.
CS-45	3914L	287' S.W. of Flower St. 1192' S.E.P.L. Paula Ave.	1927	1600	456.22	75/970	20	338.0	50-93, 107-161, 220-236, 254-273 295-328	Inactive, available for future use.
CS-46	3914M	125' S.W. of Flower St. 1192' S.E. of S.E.P.L. Paula Ave.	1927	2400	458.15	75/970	20	357.0	50-72, 83-101, 118-164, 230-245, 265-280, 314-344	Inactive, available for future use.
CS-47	3914G	209' S.W. of Flower St. 1493' S.E.P.L. Paula Ave.	1930		447.78		16	288.5	60-120, 130-150, 195-270	Inactive, eventually will be destroyed.
CS-50	3914S	710' N. of Aviation Dr. 130' S.W. of Riverside Dr.	1956	1500	~		20	330.0	106-164, 178-262, 277-312	Inactive, available for future use.

Source: LADWP, 1991a

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		Filt.		Primary	MCLs							Secondar	y MCLs			\Box	
Well	Date	Size		As	Ba	Cd	Cr	Pb	Hg	Se		Cu	Fe	T	Mn	\prod	Zn
			>MCL	50	1,000	10	50	50	2	10		1,000	300		50	\Box	5,000
	 						1			 	_ _			↓_		$\perp \perp$	ļ
CS-C01-105	Mar-91	1.2 u	2	0.0	106	0.0	0	0.0	0.0	1.		0	2,280	•	271		16
CS-C01-105	Oct-90	1.2 u	ļ	0.0	-		++	0.0	0.0	0.0				1	<u> </u>	$\perp \downarrow$	104
CS-C01-285	Mar-91	1.2 u	<u> </u>	0.0	93	0.0	6	0.0	0.0	0.0	2	0	62	_	8	\sqcup	17
CS-C01-285	Oct-90	1.2 u		0.0	<u> </u>			0.0	0.0	0.0			<u> </u>	↓_	 	$\perp \downarrow$	15
CS-C01-558	Mar-91	1.2 u		0.0	62	0.0	0	0.0	0.0	0.0	1	0	72	\sqcup	42	Ш	12
CS-C01-558	Oct-90	1.2 u	<u> </u>			<u> </u>			_]	11-	44			1		Ш	
CS-C02-062	Mar-91	1.2 u	<u> </u>	0.0	87	0.0	0	0.0	0.0	1.5	5	0	57	$\downarrow \downarrow$	6	Ш	16
CS-C02-062	May-90	1.2 u	ļ	0.0	<u> </u>		\sqcup	0.0	0.0	0.0	244			\sqcup		Ш	36
CS-C02-180	Mar-91	1.2 u	2	1.8	51	0.0		0.0	0.0	3.0	4	0	181	$\downarrow \downarrow$	54	1-1	0
CS-C02-180	May-90	1.2 u		0.0	-	<u> </u>	$\sqcup \sqcup$	0.0	0.0	0.0	1			\sqcup		\sqcup	38
CS-C02-250	Mar-91	1.2 u		1.3	58	0.0	0	0.0	0.0	0.0		0	148	\sqcup	40	\sqcup	0
CS-C02-250	May-90	1.2 u	1	0.0	<u> </u>	1		91.0	* 8.0	• 0.0				Ш	ļ	Ш	26
CS-C02-335	Mar-91	1.2 u		1.1	73	0.0	0	0.0	0.0	0.0		0	128		26	Ш	0
CS-C02-335	Мау-90	1.2 u		0.0				0.0	0.0	0.0					i	Ш	17
CS-C03-100	Apr-91	0.45 u		0.0	246	0.0	0	0.0	0.0	4.2	2	0	44	\coprod	16	Ш	16
CS-C03-100	Apr-91	1.2 u		0.0	248	0.0	0	0.0	0.0	1.1		0	65	\prod	21	\square	14
CS-C03-100	Apr-91	Unfilt	2	3.1	358	0.0	29	5.1	0.0	2.5	5	15	28,100		286	[•]	78
CS-C03-100	May-90	1.2 u		0.0				0.0	0.0	0.0						\prod	22
CS-C03-325	Apr-91	0.45 u		0.0	71	0.0	0	0.0	0.0	0.0	Π	4	57	П	31	П	0
CS-C03-325	Apr-91	1.2u		1.0	74	0.0	0	0.0	0.0	0.0	\Box	0	113	\sqcap	21	П	33
CS-C03-325	Apr-91	Unfilt	2	0.0	127	0.0	24	2.1	0.0	1.0	,	10	23,200	•	295	•	112
CS-C03-325	May-90	1.2 u		0.0	7			0.0	0.7	0.0	,					П	- 15
CS-C03-465	Apr-91	0.45 u		0.0	69	0.0	0	0.0	0.0	0.0	\Box	4	66	П	27	П	5
CS-C03-465	Apr-91	1.2 u		1.9	68	0.0	0	0.0	0.0	0.0	\Box	0	141	П	23	П	0
CS-C03-465	Apr-91	Unfilt	2	0.0	147	0.0	24	2.0	0.0	0.0	,	14	31,800	1-	307	•	154
CS-C03-465	May-90	1.2 u		0.0				0.0	0.0	0.0	,			\prod		П	11
CS-C03-550	Apr-91	0.45 u		0.0	56	0.0	0	0.0	0.0	0.0	,	4	93		41	П	0
CS-C03-550	Apr-91	1.2 u		1.4	58	0.0	0	0.0	0.0	0.0	7	0	108	П	29	П	8
S-C03-550	Apr-91	Unfilt	2	1.0	71	0.0	0	4.4	0.0	0.0	,	49	12,800	•	135	1-1	89
S-C03-550	May-90	1.2 u		0.0	1	1		0.0	0.0	0.0		1	1	T		\sqcap	13
CS-C04-290	Mar-91	0.45 u		0.0	85	0.0	0	0.0	0.0	1.1		0	85	T	22	TT	17
S-C04-290	Mar-91	1.2 u		0.0	82	0.0	0	0.0	0.0	0.0		0	20	\sqcap	32	 	4
CS-C04-290	Mar-91	Unfilt	2	1.4	126	0.0	14	6.5	0.0	1.1		5	12,200	1	218	1	48
CS-C04-290	May-90	1.2 u		0.0	 	+	 	0.0	0.0	0.0	_+-+	_ <u></u>		\vdash		-	12

					П		П				T	i	П				1	\neg		\top		\top	
	 	Filt.	 -	Primar	V MC	CLs					•	1	,	1		l I	Secon	darv	MCLs	┧		-	
Well	Date	Size		As		Ba		Cd	j***	Cr	ĵ	Pb	Ţ	Hg	m	Se	Cu	7	Fe	1-1	Mn		Zn
		0.20	>MCL	50	++	1,000	H	10	Н	50	十	50	┢	2	Н	10	1,000	+	300	╁	50	1	5,000
					\sqcap		Ħ		П		1		T	<u> </u>	П		1	+		\Box			
CS-C04-382	Mar-91	Unfilt	2	1.2		94		0.0	П	0	T	1.4	T	0.0	П	1.7	0	\top	8,720	1-1	96	•	28
CS-C04-382	Mar-91	0.45 u		0.0	П	82	П	0.0	П	0		3.0		0.0	П	1.6	0	Τ	134	\sqcap	16		5
CS-C04-382	Mar-91	1.2 u		1.2	\sqcap	77	П	0.0	П	0	Τ	0.0	İ	0.0		1.4	0	T	153	П	16		4
CS-C04-382	May-90	1.2 u		0.0			П		П		Π	0.0		0.0	П	0.0	1			П		П	10
CS-C04-520	Mar-91	Unfilt	2	0.0	П	69	П	0.0	П	0	1	1.0		0.0	П	0.0	0	1	8,570	•	86	•	15
CS-C04-520	Mar-91	0.45 u		0.0	П	57	П	0.0	П	0	Γ	2.4	Γ	0.0		0.0	0		227	П	15		0
CS-C04-520	Mar-91	1.2 u		0.0		57_		0.0		0		2.2		0.0	П	0.0	0	\top	210		14		0
CS-C04-520	May-90	1.2 u		0.0							L	0.0		0.6		0.0		$oxed{\Box}$		\prod			0
CS-C05-160	Mar-91	1.2 u		0.0		75		0.0		0		1.1	Γ	0.0		1,6	0		71		17		0
CS-C05-160	May-90	1.2 u		0.0								0.0		0.4		0.0							8
CS-C05-290	Mar-91	1.2 u		0.0		158		0.0		0		1.1		0.0		2.2	0		72	Ш	16		9
CS-C05-290	May-90	1.2 u		0.0								0.0	L	0,0		0.0							12
CS-C06-185	May-90	1.2 u		0.0								0.0		0.5		0.0				Ш			8
CS-C06-278	May-90	1.2 u																\mathbf{J}^{-}					
CS-VPB-01	Feb-91	1.2 u		0.0		92		0.0		0		0.0		0.5		0.0	0		8		16		23
CS-VPB-01	Sep-90	1.2 u			\coprod															Ш		\Box	
CS-VPB-01	Jan-90	1.2 u																					
CS-VPB-01	Sep-89	Unfilt	1	95.0	•		\prod	6.0		99	•	55.0	•	3.4	•	0.0	58						94
CS-VPB-02	Sep-90	1.2 u		0.0				0.0		0		0.0		0.0		0.0	0						11
CS-VPB-02	Jan-90	1.2 u																		\coprod			
CS-VPB-02	Sep-89	Unfilt	1	50.0	•			0.0		49		15.0		0.0		0.0	70						110
CS-VPB-03	Jan-91	1.2 u		0.0			_[.	0.0		0		0,0		0.0		0.0	0			\prod			8
CS-VPB-04	Apr-91	1.2 u		2.2		116		0.0		28		14.0		0.0		0.0	0		8		13		5
CS-VPB-04	Sep-90	1.2 u		16.0				0.0		0		0,0		0.0		0.0	0						28
CS-VPB-04	May-90	1.2 u		0.0				0.0		70		0.0		0.0		0.0	0						28
CS-VPB-04	Jan-90	1.2 u					Т													\prod			
CS-VPB-04	Sep-89	Unfilt	1	89.0	•		$\Box\Gamma$	0.0		56	•	0.0		0.0		0.0	39	$\prod_{i=1}^{n}$					55
S-VPB-05	Feb-91	1.2 u		0.0		124	T	0.0		17		0.0		0.3		0.0	0		8		15		14
S-VPB-05	Sep-90	1.2 u		11.0			T	0.0		0	П	0.0		0.0		0.0	0						40
S-VPB-05	May-90	1.2 u		0,0			1	0.0	\neg	0	П	0.0		0.8		0.0	0	\top		\prod		П	8
S-VPB-05	Jan-90	1.2 u					\top		\exists		П		П				1	\top		\sqcap		П	
S-VPB-05	Sep-89	Unfilt	1	33.0			_ -	14.0	•	60	•	0.0	П	0.0		0.0	75			П		П	110
S-VPB-06	Feb-91	1.2 u		0.0		43	7	0.0	7	9	П	0.0	П	0.5		0.0	0	П	24	\sqcap	11	П	35
S-VPB-06	Sep-90	1,2 u		7.0			+	0.0	7	0	П	0.0	T	0.0	1	0.0	0	\top		П		П	48

					\prod				T	Т												
	7	Filt.		Primar	y MC	CL.											Seconda	ry I	MCLe		ΠŤ	
Well	Date	Size		A٠		Ba		Cd	Cr	m	РЬ		Hg		Se		Cu	Ť	Fe	Mn	\sqcap	Zn
			>MCL	50		1,000		10	50		50	П	2		10		1,000		300	50		5,000
CS-VPB-06	May-90	1.2 u	1	0.0	++		+	0.0	0	+	0.0	Н	3.4	•	0.0	\vdash	0	┥	+	 	-	19
CS-VPB-06	Jan-90	1.2 u					\top		†	1		Н						7				
CS-VPB-06	Sep-89	Unfilt	1	25.0	11		7	0.0	26	1	0.0	П	1.4	П	0.0	-	32	7		†	$\neg \vdash$	65
CS-VPB-07	Feb-91	1.2 u		0.0	\sqcap	123	7	0.0	7	Τ	0.0	П	0.4	П	0.0		0		25	17		8
CS-VPB-07	Sep-90	1.2 u		16.0	\Box		1	0.0	0	1	0.0		0.0	П	0.0		0					0
CS-VPB-07	Jan-90	1.2 u			17					T		П		П				\neg				
CS-VPB-08	Feb-91	1.2 u		0.0		153		0.0	9		0.0		0.5	П	0.0		0		9	11		4
CS-VPB-08	Sep-90	1.2 u		0.0	\square			0.0	0	Г	0.0		0.0		0.0		0					20
CS-VPB-08	Jan-90	1.2 u			П				<u> </u>	Γ		П		П								
CS-VPB-08	Sep-89	Unfilt	1	59.0	•			0.0	72	•	10.0		3.5	•	19.0	•	100				\top	120
CS-VPB-09	Sep-90	1.2 u	}	0.0	$\prod_{i=1}^{n}$			0.0	0	Γ	0.0		0.0	П	0.0		0	1				22
CS-VPB-09	Jan-90	1.2 u			П				Γ.	Γ		П		П				Т			\Box	
CS-VPB-09	Sep-89	Unfilt	1	85.0	•		\top	0.0	120	•	8.0	П	0.0	П	0.0	П	82	T			7	220
CS-VPB-10	Sep-90	1.2 u		0.0	П		_ [(0,0	0	Г	0.0		0.2	П	0.0		0				\Box	13
CS-VPB-10	Jan-90	1.2 u			П									П		П						
CS-VPB-10	Sep-89	Unfilt	1	39.0	П		1	3.0	73	•	10.0	Ī	0.0	П	18.0	•	63	T			\top	160
CS-VPB-11	Sep-90	1.2 u		0,0	П		7	0.0	0	Π	0.0		0.0	П	0.0		0	T			\neg	43
CS-VPB-11	Jan-90	1.2 u					\top		<u> </u>	T		П		П		П		T			7	
CS-VPB-11	Sep-89	Unfilt	11	115.0			(0.0	83	•	25.0		0.0		0.0		78	7			\bot	240
Votes:	All values	in ug/l			╫		+-	\dashv	ļ	\vdash		\dashv		$\left \cdot \right $		H		+				
	"G" wells	are Gran	dview w	ells and	are	sometim	nes r	eferred	to as '	'G\	/-					П		T	1		\top	
	"CS" - Cr				П		Τ			Π				П		П		T	á L		T	
	" * " - dend				ve N	VICL	\top			П		7				П		7			\top	
	"1" - dend						ary	MCL.		П		\dashv	-					T			\top	
	"2" - dend								L (not el	hov	vn whe	ra	nzima	~ A	ACL is	AY	(bebeen	\neg			\top	

Attachment 2

JAMES M. MONTGOMERY, INC. 365 Lennon Lane, Walnut Creek, California 94598

MEMORANDUM

TO:

Claire Trombadore

DATE:

June 18, 1992

FROM:

Eliana Makhlouf

FILE:

887.0312

CLIENT: LADWP

PROJECT: Glendale Study Area:

North Plume Operable Unit (OU)

Feasibility Study (FS)

SUBJECT: FIELD FILTERING OF GROUNDWATER SAMPLES

During the initial sampling (September, 1989) of the Crystal Springs vertical profile borings (VPBs), groundwater samples collected for priority pollutant metals were not field filtered (JMM, 1991). These samples contained a few slightly elevated concentrations (above maximum contaminant levels [MCLs]) of the following metals: arsenic, cadmium, chromium, lead, and mercury. Following the initial VPB sampling, concern arose over the representation of mobile, dissolved metal constituents versus immobile metals sorbed onto suspended solids present in the unfiltered groundwater samples, particularly from newly installed monitoring wells. In newly installed wells, suspended solids that are generally immobile in aquifer systems may have been introduced during drilling, or from formation disturbance of the naturally occurring mineral formations (commonly termed "sampling artifacts"). Furthermore, bailers were used during the initial sampling event since dedicated sampling pumps were not installed. Using bailers to collect groundwater samples may cause the entrainment of suspended solids, which are not representative of mobile constituents in the aquifer formation (USEPA, 1989). Additionally, as part of the U.S. Environmental Protection Agency (USEPA)-approved protocol, the groundwater samples collected for metal analyses were discharged directly into a sample bottle containing nitric acid preservative to increase sample holding times to 6 months. The nitric acid preservative effectively dissolves the suspended solids in the samples, releasing sorbed, coprecipitated, and occluded metal ions, thus increasing the metals concentrations in these samples.

During all subsequent sampling events in the Crystal Springs area (VPB Resampling, September 1990; Cluster Well Sampling Events, May and October 1990), metals samples were field filtered using a 1.2 micron (µm) cartridge filter to more accurately determine the mobile, dissolved metals concentrations in groundwater. During these events, only chromium and mercury were detected in one sample each at levels slightly above MCLs

(JMM, 1991). By considering only the most recent sample collected from each of the monitoring wells in the North Plume area, no metals were detected above MCLs in the Upper Zone of the aquifer. These data indicate that metals are not present at elevated levels (above MCLs) on a regional scale and that the detected levels are probably indicative of naturally occurring sediments. Therefore, although two metals were detected in one sample, each slightly above their respective MCLs, during earlier sampling events, these constituents are not prevalent and are not expected to be present in the extracted groundwater above their MCLs. Furthermore, the remedial alternatives presented in the Feasibility Study for the Glendale Study Area, North Plume OU (JMM, 1992) include prefiltration to remove suspended solids prior to treatment of the extracted groundwater for VOCs.

Based on the results of previous investigations and on a study of the effect of field filtration on the analysis of dissolved metals concentrations in groundwater conducted as part of the Remedial Investigation (RI) of Groundwater Contamination in the San Fernando Valley. the 1.2-µm filter was chosen for field filtration of metals samples. Field filtration with a 1.2-um filter is assumed to eliminate errors introduced by the dissolution of immobile, suspended particulate matter ("sampling artifacts"), while reducing nonconservative errors, if the postulated facilitated transport mechanisms are important in metal transport in aquifers (Puls and Barcelona, 1989). Previous investigations conducted by Puls and Barcelona (1989) contend that colloids in the range of 0.1 to 1.0 µm may be mobile in sandy porous media; however, questions remain regarding the degree of colloid transport through silt and clay aquifers (Mason et al., 1992). Hiemenz (1977) also considers particles up to 1 μm to be colloidal. However, others (Turner Whitfield, 1980; Florence, 1982; and Salomens and Forstner, 1984) have operationally defined 0.45 µm as the border between the dissolved and particulate fractions. In the study conducted as part of the basin-wide RI, seven wells in two clusters were selected for filtered and unfiltered metals analyses. These wells represented groundwater sampled from the Upper, Lower, and Middle Zone depths of the aquifer. Three samples were collected from each well and were either unfiltered, passed through a 1.2-µm filter, or passed through a 0.45 µm filter.

Table 1 presents a summary of each constituent measured, and a relative comparison of the 1.2-µm-filtered value versus the unfiltered value as a percentage. The range and average for filtered sample value as a percent of unfiltered sample value are also presented on Table 1. The metals that were most impacted by 1.2-µm filtering were aluminum, iron, manganese, and zino. The average value for filtered as a percent of unfiltered for these

constituents ranged from less than 1 to 45 percent. Barium, calcium, magnesium, and vanadium had overall lower concentrations in 1.2-µm filtered samples than unfiltered samples. Arsenic values in the 1.2-µm filtered and unfiltered samples were about the same except that the filtered values from the Upper Zone were lower than the unfiltered. Chromium values were lower in the 1.2-µm filtered groundwater samples from the Upper Zone and were the same as values in unfiltered samples from the deeper zones of the aquifer. Lead concentrations were lower overall in the 1.2-µm filtered groundwater samples, except in the deepest well in CS-CO4, where the filtered values were twice the unfiltered values. Scienium concentrations were generally lower in concentration in the 1.2-µm filtered samples. Field filtering had no effect on analyses for antimony, beryllium, cadmium, cobalt, mercury, nickel, and thallium, and had very little effect on sodium. For silver and copper, filtering influenced analyses performed on groundwater samples from CS-CO3 wells, but not on those from the CS-CO4 wells.

The influence of filter size on metals concentrations was also investigated by separately filtering samples with a 0.45-µm and a 1.2-µm filter. Table 2 presents a comparison of the 1.2-µm-filtered value with the 0.45-µm-filtered value as a percent for each constituent. Results from separate analyses performed on the twenty-three 1.2-µm-filtered samples and the 0.45-µm-filtered samples indicated that the size of the filter did not significantly affect the results for 15 out of 23 constituents. The difference in filter size had the most influence on constituents such as antimony, arsenic, copper, iron, manganese, potassium, vanadium, and zinc. Therefore, the 1.2-µm filter was selected for use in subsequent sampling events to minimize the effects of metals associated with immobile suspended solids.

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TABLE 1

FILTERED (1.2 MICRON) SAMPLE VALUES AS A PERCENT OF UNFILTERED SAMPLE VALUES
FOR METALS AND INORGANIC ANALYSES AT SELECTED CLUSTER WELLS

			Per	cent Value by \	Well			· · ·
	CS-C03-100	CS-C03-325	CS-C03-465	CS-C03-550	CS-C04-290	CS-CO4-382	CS-CO4-520	Range
Alumimum	0	1	1	7	2	14	46	0 - 46
Antimony	92	100	100	100	136	159	100	92 - 159
Arsenic	42	100	190	140	71	100	100	42 - 190
Barium	69	58	46	81	65	82	84	46 - 84
Beryllium	100	100	100	100	100	100	100	100 - 100
Cadmium	100	100	100	100	100	100	100	100 - 100
Calcium	97	91	<i>7</i> 9	84	99	91	86	79 - 99
Chromium	27	33	34	100	43	100	100	27 - 100
Cobalt	100	100	100	100	100	100	100	100 - 100
Copper	20	29	22	6	100	100	100	6 - 100
ron	0	0	O	1	Ð	2	2	0-2
Lead	20	48	50	23	15	71	220	15 - 220
Magnesium	87	83	81	92	96	97	92	81 - 97
Manganese	7	7	7	21	15	16	16	7 - 21
Mercury	100	100	100	100	100	100	100	100 - 100
Nickel	100	100	100	100	100	100	100	100 - 100
Potassium	44	79	69	92	100	139	107	44 - 139
Selenium	79	100	100	100	91	82	100	79 - 100
Silver	48	66	63	100	100	100	100	48 - 100
Sodium	97	101	97	95	103	98	94 ′	94 - 103
Thallium	100	100	100	100	100	100	100	100 - 100
Vanadinm	38	38	17	62	35	67	84	17 - 84
Zinc	18	29	3	9	9	15	27	3 - 29

TABLE 2
FILTERED (0.45 MICRON) SAMPLE VALUES AS A PERCENT OF FILTERED (1,2 MICRON) SAMPLE VALUES
FOR METALS AND INORGANIC ANALYSES AT SELECTED CLUSTER WELLS

	 ,		Per	cent Value by V	Vell	 		_
	CS-CO3-100	CS-C03-325	CS-C03-465	CS-C03-550	CS-C04-290	CS-C04-382	CS-C04-520	Range
Alaminam	4879	100	100	100	100	100	100	100 - 4879
Antimony	87	100	100	100	167	66	100	66 - 167
Arsenic	100	100	53	71	100	83	100	53 - 100
Berium	99	96	101	98	103	106	100	96 - 106
Beryllium	100	100	1 0 0	100	100	100	100	100 - 100
Cadmium	100	100	1 00	100	100	100	100	100 - 100
Calcium	102	99	106	104	10 1	105	1 0 2	99 - 106
Chromium	100	100	100	100	100	100	100	100 - 100
Cobalt	100	100	100	100	100	100	100	100 - 100
Copper	100	123	133	130	100	100	100	100 - 133
rom	68	50	46	86	340	88	108	46 - 340
ead	100	100	1 0 0	100	100	300	109	100 - 300
viagnesium.	101	100	103	104	98	104	101	98 - 104
fanganese	80	150	118	143	49	103	109	49 - 150
decoury	100	100	100	100	100	100	100	100 - 100
Tickel	100	100	100	100	100	100	100	100 - 100
Potassium	108	92	107	105	69	100	100	69 - 108
Selenium	382	100	100	100	110	114	100	100 - 382
Silver	88	100	100	100	100	100	100	88 - 100
Sodium	100	98	102	104	98	105	103	98 - 105
Challium	100	100	100	100	100	100	100	100 - 100
Vanadium	109	56	133	87	170	74	125	56 - 1 <i>7</i> 0
Zimc	116	12	118	51	95	107	100	12 - 118



Discussion of Papers

DISCUSSION OF "Literature Review and Model (COMET) for Colloid/Metals Transport in Porous Media," by W. B. Mills, S. Llu, and F. K. Fong, March-April 1991 Issue, v. 29, no. 2, pp. 199-208

by Sharon A. Mason, John Barkach, and James Dragun, The Dragun Corporation, 3240 Coolidge, Berkley, Michigan 48072-1634

Effect of Filtration on Colloid Transport in Soil Introduction

Colloid transport in subsurface media has been investigated and discussed by several researchers (Bitton et al., 1979; Jansons et al., 1989; Keswick and Gerba, 1980; Lance and Gerba, 1984; McCarthy, 1990; McDowell-Boyer et al., 1986; Reddy et al., 1981; Wollum and Cassel, 1978; Yates et al., 1987). Mills et al. (1991) discussed the primary mechanisms that influence the transport of colloids. Furthermore, they have proposed a model that can be used to evaluate the significance of the transport of colloids in soil systems.

First, Mills et al. (1991) have correctly identified Brownian motion as a primary mechanism affecting colloid transport in soil. In general, Brownian motion refers to the suspension of colloidal particles in a liquid due to the impact of the molecules comprising the liquid upon the colloidal particles (McDowell-Boyer et al., 1986; O'Melia, 1980; Prieve and Ruckenstein, 1974; Sax and Lewis, 1987; Tien and Payatakes, 1979; and Yao et al., 1971)

Second, Mills et al. (1991) have correctly identified that colloid surface forces are a primary mechanism affecting colloid transport in soil. These mechanisms basically cause the particles to either "stick" to or repel from one another after collision (McDowell-Boyer et al., 1986; and Prieve and Ruckenstein, 1974).

Although Mills et al. (1991) briefly mention filtration, they for all practical purposes ignore this mechanism in the model.

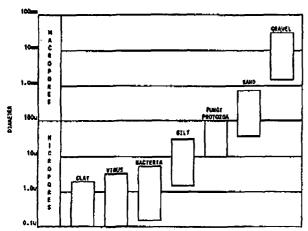


Fig. 1. Ranges of diameters for soil particles and blots (Dragun, 1988).

Yet, the effect of this mechanism on colloid transport in soil systems and on modeling colloid transport is profound. Because the effect of filtration is not considered in the model, the model output may be misleading.

This paper will briefly discuss the importance of filtration. Also, it will present an equation for determining if filtration will inhibit the migration of colloidal particles in soil systems. This equation should be utilized to determine if the model proposed by Mills et al. (1991) can be used to evaluate the significance of the migration of metals via colloid transport in soil systems.

How Soil Pore Size Restricts Colloid Transport

For colloids to migrate in porous media, colloid size as well as the pore size of the soil/aquifer material must be considered (Dragun, 1988; Enfield et al., 1989; Matthess and Pekdeger, 1981; Rege and Fogler, 1988; Tien and Payatakes, 1979). For migration of a colloidal particle to occur in soil, the diameter of the migrating colloid particle must be significantly smaller than the diameter of the soil pore. If it is not, then the particle is "filtered" from the migrating liquid.

How to Predict the Effect of Soll Pore Size on Colloid Transport

A general rule for the migration of bentonite particles in grout through soil pores can be utilized to estimate the migration potential of any particle in soil. A bentonite particle will penetrate soil pores if the ratio, R, is at least 29 and preferably greater than 24. R is defined as follows (Spooner et al., 1984):

$$R = D_{15}/D_{85} (1)$$

and D_{13} = diameter of the particles comprising the soil, where 15 percent of the soil mass is finer; and D_{55} = diameter of the migrating bentonite (or soil) particle, where 85 percent of the particles is finer.

It is important to recognize that equation (1) can be utilized not only for identifying the migration potential of a soil particle, but also for colloids, including bacterium and virus particles.

Figure 1 illustrates the ranges of diameters for soil particles and biota. We can show the utility of equation (1) and Figure 1 for identifying the migration potential of any particle.

Bacteria and viruses have diameters generally similar to that of clay. According to Figure 1, the D_{55} for bacteria is approximately 1.2 u. For bacteria to migrate, the D_{15} of the soli must be 30.0 u, based on the previous equation and assuming an R equal to 25.

A further analysis of Figure I will reveal that if this colloid is going to migrate, 85 percent of the soil texture must be comprised of coarser silt, sand, and gravel. The soil classes corresponding to this textural range are sandy loams, loamy sands, and sands. Based on this analysis, bacteria should not migrate in silty and clay soils due to their small pore diameters. Likewise, colloidal clay particles should not migrate in silty and clay soils due to their small pore diameters.

The data on bacteria, virus, and clay migration in soil and ground water from many published studies (see Table 1) support the conclusion that colloid size particles generally migrate in sand, coarse sand, and gravel. Conversely, bacteria, virus, and clay colloid migration in silt and clay soils are restricted via filtration; this conclusion, however, should not apply to macropores in these soils.

The model proposed by Mills et al. (1991) did not present a method by which a user could determine if the effect of filtration was significant, which could preclude the use of the proposed model. Equation (1) can be used to determine if the proposed model can give meaningful results and avoid the generation of misleading data.

Table 1. Studies of the Migration of Colloid Size Particles Through Porous Materials

TO:

Aquifer material	Colloid	Reference
Silica sand	Staphylococcus aureus	Hendricks et al., 1979
Sand	Poliovirus	Wang et al., 1981
Sandy loam	Poliovirus	Wang et al., 1981
Sand	Latex particles (0.091 u)	Yao et al., 1971
Dune sand	Poliovirus	Lance and Gerba, 1982
Sand	Bacteria	Lance and Gerba, 1982
Gravel and fine sands	Bacillus coli, fecal coliforms, and fecal streptococci	Crane and Moore, 1984
Sand and gravel	0.1 to 2 um	Gschwend et al., 1990
Oravel, sand, and silt	<2 nm	Waber et al., 1990
Sand	Poliovirus	Vilker, 1980
Sand	Latex microspheres (0.12 um)	Lahav and Tropp, 1980
Sand	Zoospores	Wilkinson et al., 1981
Sandy clay loam	Zoospores	Wilkinson et al., 1981
Loam	Zoospores	Wilkinson et al., 1981
Sand	Streptomyces	Wollum and Cassel, 1978
Sand	Poliovirus	Jansons et al., 1989
Pea gravel and loamy sand	Poliovirus	Lance and Gerba, 1984

Summary and Conclusions

In summary, for colloids to migrate in porous media, colloid size as well as pore size of the soll/aquifer material must be considered. The diameter of the migrating colloid particle must be significantly smaller than the diameter of the soil pore for migration to occur, otherwise, filtration of the colloidal particle suspended in the migrating liquid will occur. An analysis of published data on bacteria, viruses, and clay migration in soil reveals that these colloid size particles generally migrate in sand, coarse sand, and gravel. Therefore, in order to accurately model colloid transport in porous media, colloid size as well as pore size of the subsurface media must be considered.

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REPLY TO the preceding Discussion by Sharon A. Mason, John Barkach, and James Dragun of "Literature Review and Model (COMET) for Colloid/Metals Transport in Porous Media" by William B. Mills, Sally Liu, and Fred K. Fong

We appreciate Mason et al. detailed discussion of filtration on colloid transport, and in particular their equation (1) which can be used to approximate pore size effects on colloid transport. As indicated in our paper, COMET is intended to be "a low-level test model of the effects of colloid facilitated transport" (i.e., a screening model). Consequently, the approach to colloid filtration offered by Mason et al. is consistent with the screening level approach of COMET, and therefore offers valuable information on whether the model is appropriate for a particular aquifer application.

CORRECTIONS TO "Subsurface Partitioning of Voiatile Organic Compounds: Effects of Temperature and Pore-Water Content," September-October 1991 Issue, v. 29, no. 5, pp. 678-684

by H. S. Kerloot, Kerloot and Associates, 2200 E. Patrick Lane, Suite 23, Las Vegas, Nevada 89119

Please note the following corrections to my paper.

1. Equation (5) should have C. d(H/KD)/dT as the first term on the right-hand side.

2. The second term on the right-hand side of equation (13) should be:

$HC_w(\Delta H_{wx}/RT^2)$

3. C_s in equation (22) should be C_g.

4. In the line above equation (21), "... surface ... "should be "... subsurface"

I hope these errors have not caused any trouble for readers.

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State means the several states of the United States, the District of Columbia, the Commonwealth of Puerto Rico. Guam, American Samoa, the Virgin Islands, the Commonwealth of Northern Marianas, and any other territory or possession over which the United States has jurisdiction. For purposes of the NCP, the term includes Indian tribes as defined in the NCP except where specifically noted. Section 126 of CERCLA provides that the governing body of an Indian tribe shall be afforded substantially the same treatment as a state with respect to certain provisions of CERCLA. Section 300.515(b) of the NCP describes the requirements pertaining to Indian tribes that wish to be treated as states.

Superfund Memorandum of Agreement (SMOA) means a nonbinding, written document executed by an EPA Regional Administrator and the head of a state agency that may establish the nature and extent of EPA and state interaction during the removal, pre-remedial, remedial, and/or enforcement response process. The SMOA is not a site-specific document although attachments may address specific sites. The SMOA generally defines the role and responsibilities of both the lead and the support agencies.

Superfund state contract is a joint, legally binding agreement between EPA and a state to obtain the necessary assurances before a federal-lead remedial action can begin at a site. In the case of a political subdivision-lead remedial response, a three-party Superfund state contract among EPA. the state, and political subdivision thereof, is required before a political subdivision takes the lead for any phase of remedial response to ensure state nvolvement pursuant to section 121(f)(1) of CERCLA. The Superfund state contract may be amended to provide the itate's CERCLA section 104 assurances refore a political subdivision can take he lead for remedial action.

Support agency means the agency or gencies that provide the support gency coordinator to furnish necessary lata to the lead agency, review. esponse data and documents, and rovide other assistance as requested by te OSC or RPM. EPA, the USCG, nother federal agency, or a state may e support agencies for a response ction if operating pursuant to a ontract executed under section 14(d)(1) of CERCLA or designated ursuant to a Superfund Memorandum Agreement entered into pursuant to ibpart F of the NCP or other treement. The support agency may also incur on decision documents.

Support agency coordinator (SAC) means the official designated by the support agency, as appropriate, to interact and coordinate with the lead agency in response actions under subpart E of this part.

Surface collecting agents means those chemical agents that form a surface film to control the layer thickness of oil.

Threat of discharge or release, see definitions for discharge and release.

Threat of release, see definition for release.

Treatment technology means any unit operation or series of unit operations that alters the composition of a hazardous substance or pollutant or contaminant through chemical, biological, or physical means so as to reduce toxicity, mobility, or volume of the contaminated materials being treated. Treatment technologies are an

alternative to land disposal of

hazardous wastes without treatment. Trustee means an official of a federal natural resources management agency designated in subpart G of the NCP or a designated state official or Indian tribe who may pursue claims for damages under section 107(f) of CERCLA.

United States when used in relation to section 311(a)(5) of the CWA, means the states, the District of Columbia, the Commonwealth of Puerto Rico, the Northern Mariana Islands, Guam, American Samoa, the United States Virgin Islands, and the Pacific Island Governments. United States, when used in relation to section 101(27) of CERCLA, includes the several states of the United States, the District of Columbia, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Marianas, and any other territory or possession over which the United States has jurisdiction.

Vessel as defined by section 101(28) of CERCLA, means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water; and, as defined by section 311(a)(3) of the CWA, means every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water other than a public vessel.

Volunteer means any individual accepted to perform services by the lead agency which has authority to accept volunteer services (examples: See 16 U.S.C. 742f(c)). A volunteer is subject to the provisions of the authorizing statute and the NCP.

§ 300.6 Use of number and gender.

As used in this regulation, words in the singular also include the plural and

words in the masculine gender also include the feminine and vice versa, as the case may require.

§ 300.7 Computation of time.

In computing any period of time prescribed or allowed in these rules of practice, except as otherwise provided, the day of the event from which the designated period begins to run shall not be included. Saturdays, Sundays, and federal legal holidays shall be included. When a stated time expires on a Saturday, Sunday, or legal holiday, the stated time period shall be extended to include the next business day.

Subpart B-Responsibility and **Organization for Response**

§ 300.100 Duties of President delegated to federal agencies.

In Executive Order 11735 and Executive Order 12580, the President delegated certain functions and responsibilities vested in him by the CWA and CERCLA, respectively.

§ 300.105 General organization concepts.

(a) Federal agencies should:

(1) Plan for emergencies and develop procedures for addressing oil discharges and releases of hazardous substances. pollutants, or contaminants;

(2) Coordinate their planning, preparedness, and response activities

with one another;

(3) Coordinate their planning. preparedness, and response activities with affected states and local governments and private entities; and

(4) Make available those facilities or resources that may be useful in a response situation, consistent with agency authorities and capabilities.

(b) Three fundamental kinds of activities are performed pursuant to the

NCP:

(1) Preparedness planning and coordination for response to a discharge of oil or release of a hazardous substance, pollutant, or contaminant;

(2) Notification and communications;

and

(3) Response operations at the scene of a discharge or release.

(c) The organizational elements created to perform these activities are:

(1) The National Response Team (NRT), responsible for national response and preparedness planning, for coordinating regional planning, and for providing policy guidance and support to the Regional Response Teams. NRT membership consists of representatives from the agencies specified in § 300.175.

(2) Regional Response Teams (RRTs), responsible for regional planning and preparedness activities before response